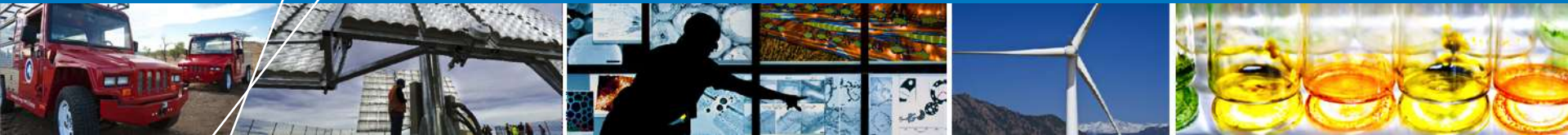


# Release of the New National Solar Radiation Database (NSRDB)



## NSRDB Webinar

**Dr. Manajit Sengupta, Anthony Lopez,  
Aron Habte, Dr. Yu Xie, Andrew  
Weekley, Christine Molling, Christian  
Gueymard, Paul Edwards, and Dan  
Getman**

**December 08, 2015**

# Webinar Outline

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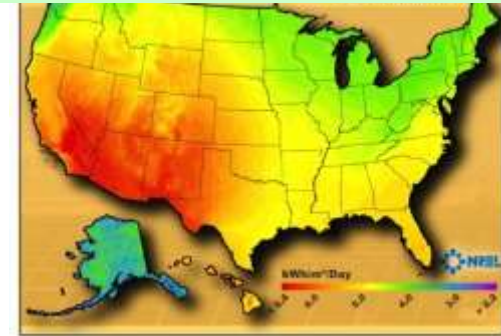
- **Motivation and History**
- **Development of the New Gridded NSRDB**
  - Physical Solar Model (PSM) Framework
- **New NSRDB Website and How to Access Data**
- **Data Availability**
- **Future Plans**

# Motivation

Support DOE SunShot goal of reducing the costs of solar deployment and financing through providing high-quality publicly available solar resource information

Concept

Policy Decisions  
Site / Technology Selection

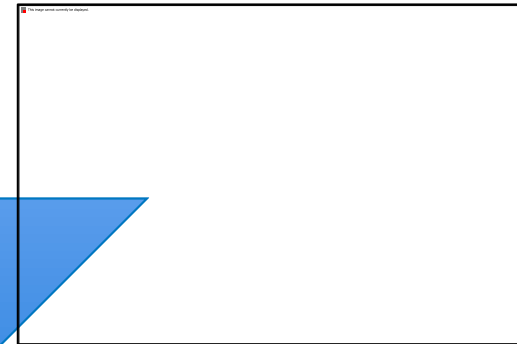


Feasibility

Investor Commitment  
Project Approvals

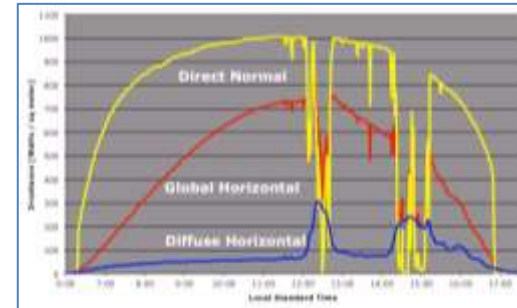
Due Diligence

Engineering Design  
System Integration



Operations

System Tests  
Operation & Maintenance  
Energy System Integration



# National Solar Radiation Database: History

<http://nsrdb.nrel.gov>

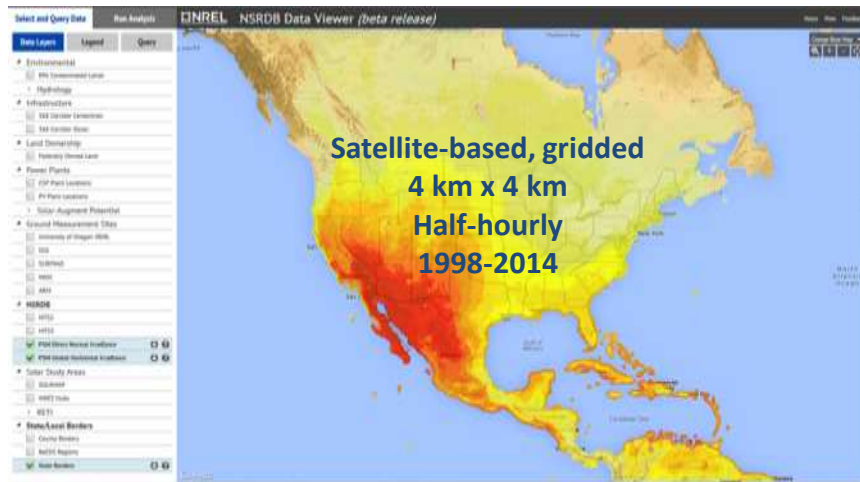
## Evolution of Public Solar Data

1952-1975 SOLMET<sup>1</sup> [ERDA, NOAA, 1979]

1961-1990 NSRDB<sup>2</sup> [DOE, NOAA, 1994]

1991-2005 NSRDB-II<sup>3</sup> [DOE, NOAA, 2007]

1998-2014 NSRDB [DOE, NOAA, UW, SCS 2015]



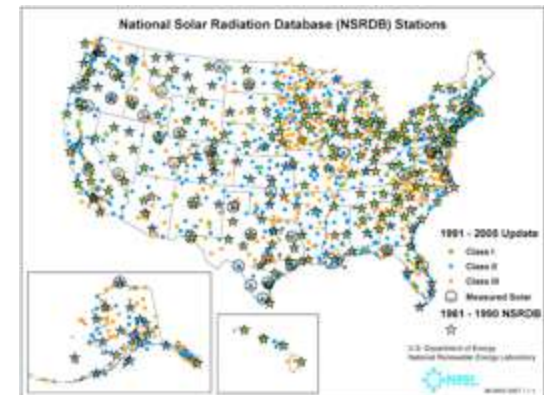
(1)  
248 stations  
with 26  
**Measurement**  
Stations  
1977-80



(2)  
239 **Modeled**  
Stations with  
56 partial  
measurement  
stations  
1990



(3)  
1,454  
**Modeled**  
Locations  
1991-2005



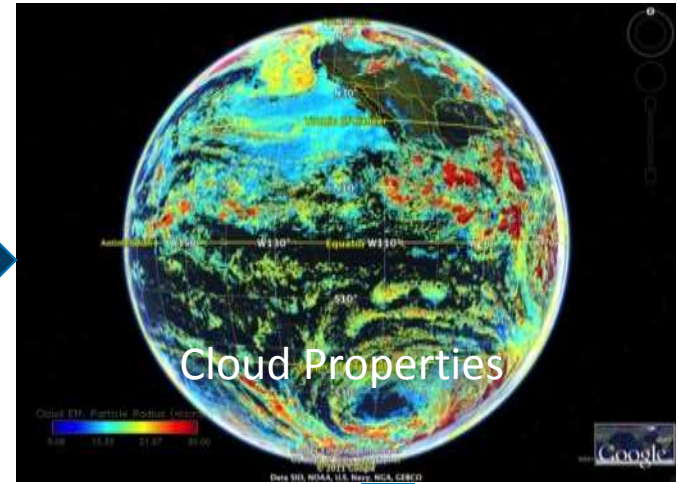
# How Do Satellites Model Surface Radiation?

- **Empirical Approach (Traditional Approach):**
  - Build model relating satellite measurements and ground observations (cloud index and clearness index)
  - Use those models to obtain solar radiation at the surface from satellite measurements
- **Physical Approach: (New Approach)**
  - Retrieve cloud and aerosol information from satellites
  - Use the information in a radiative transfer model

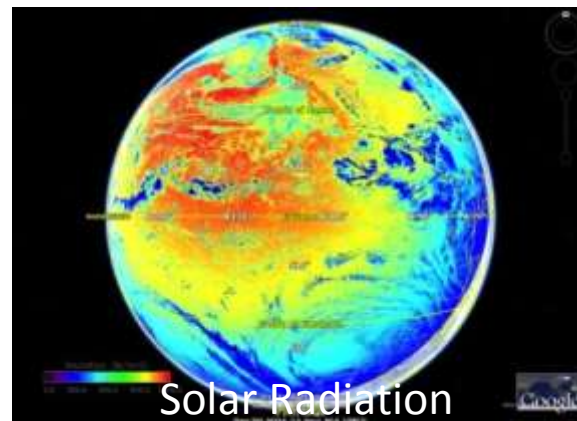
# Physical Approach to Satellite Modeling



**Satellite-Based  
Cloud Retrieval  
Model**

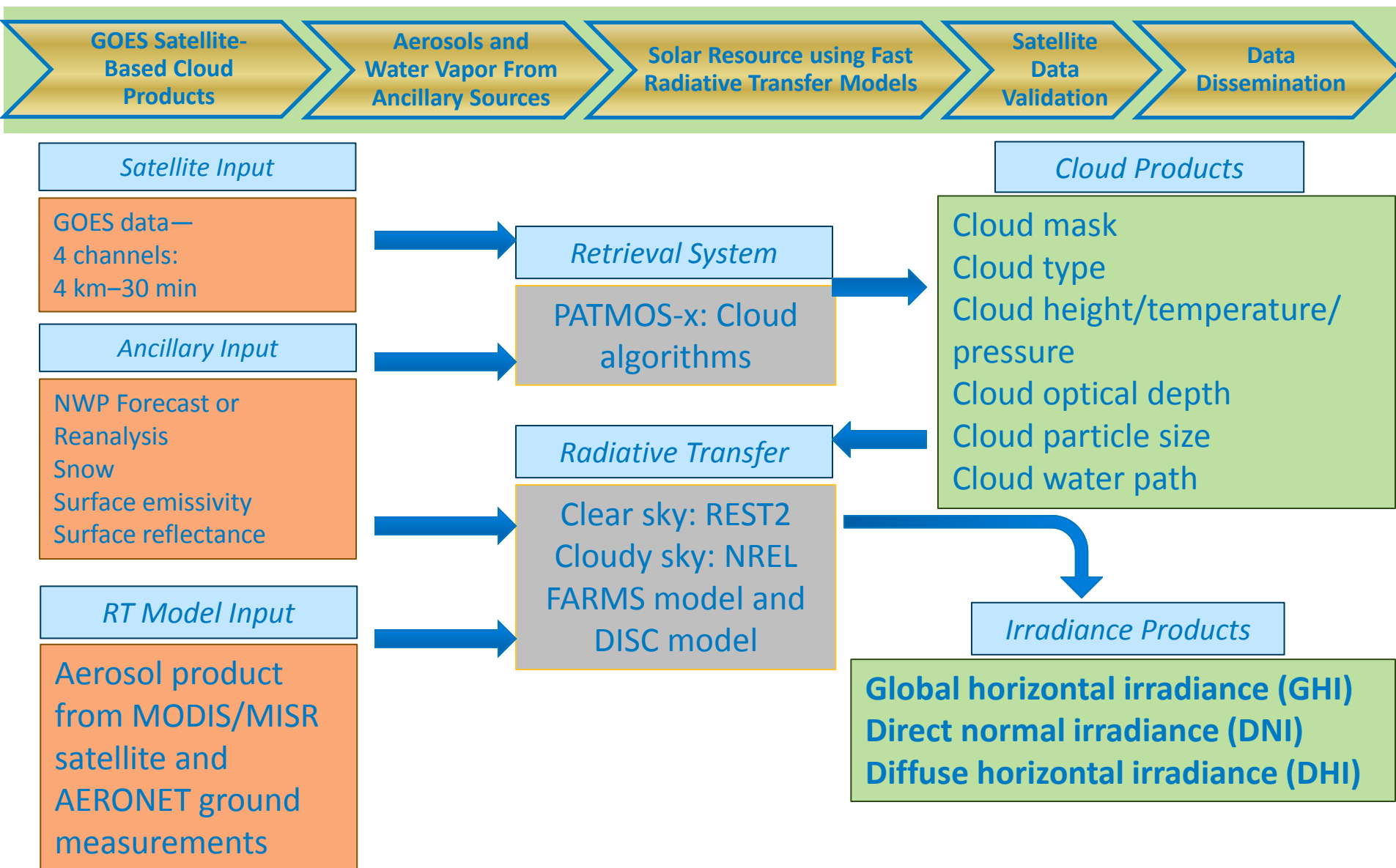


**Radiative  
Transfer Models**

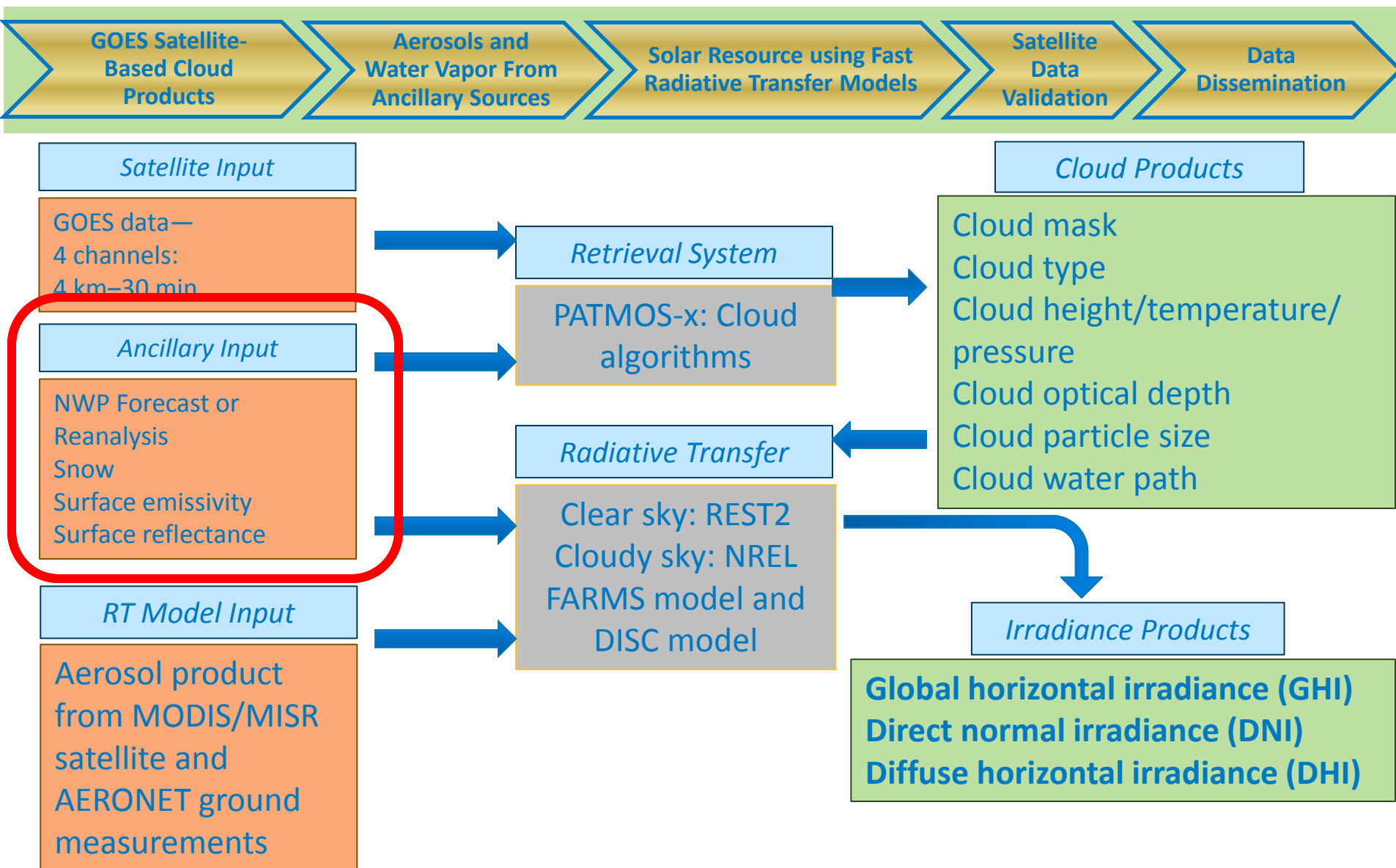




# Physical Solar Model (PSM) Framework



# PSM: Ancillary/Met Data

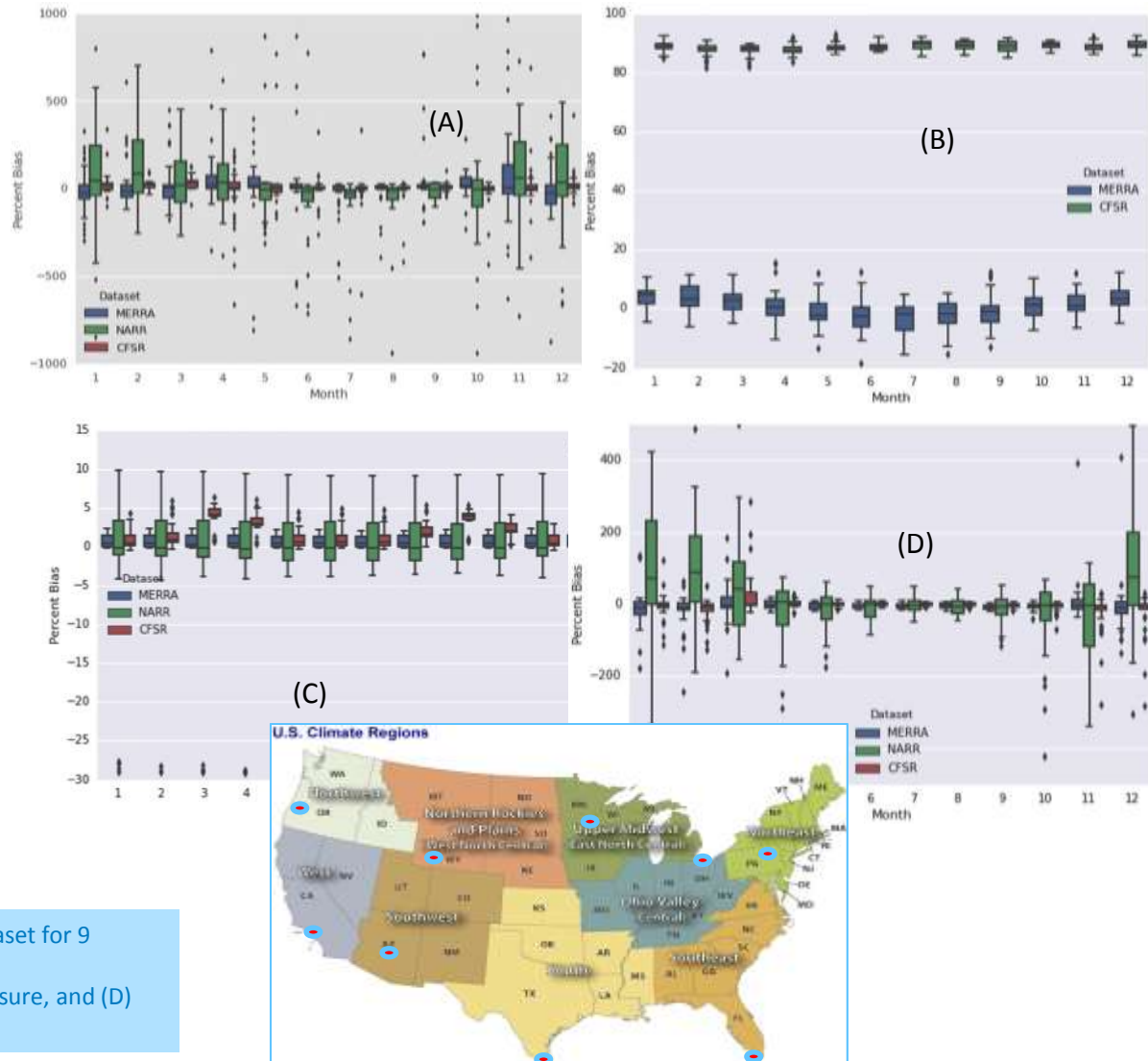




# Met Data for PSM

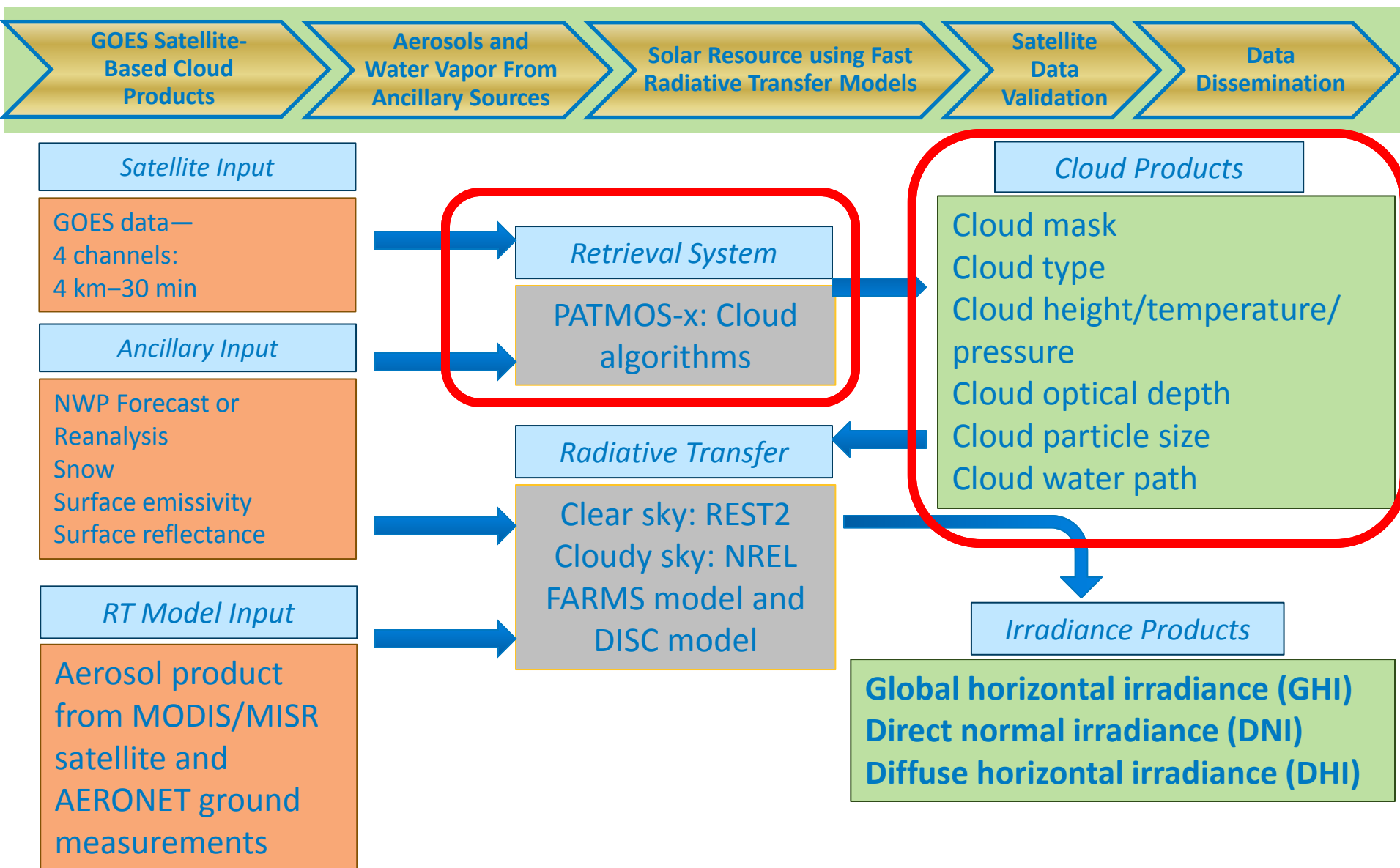
- Accurate meteorological dataset for use in the NSRDB

- Various reanalysis datasets compared with ground measurements (all Integrated Surface Database (ISD) stations) to identify best data
- NASA Modern Era-Retrospective Analysis (MERRA) dataset, NOAA's North American Regional Reanalysis (NARR) dataset, and NOAA's Climate Forecast System Reanalysis (CFSR) compared
- MERRA found to be the most accurate



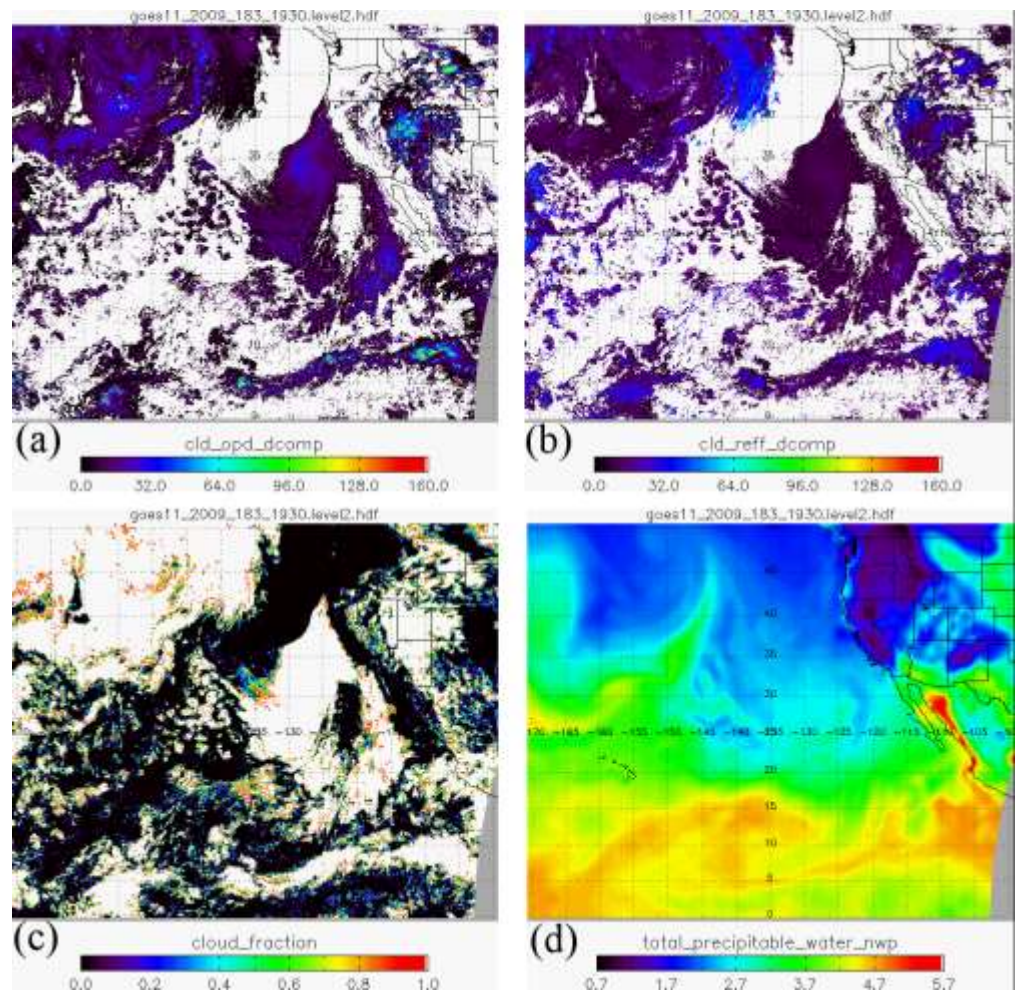
Comparison between ISD and MERRA, CFSR, and NARR dataset for 9 stations  
(A) Dew Point, (B) Precipitable Water, (C) Atmospheric Pressure, and (D) Wind Speed comparison

# PSM: Cloud Products

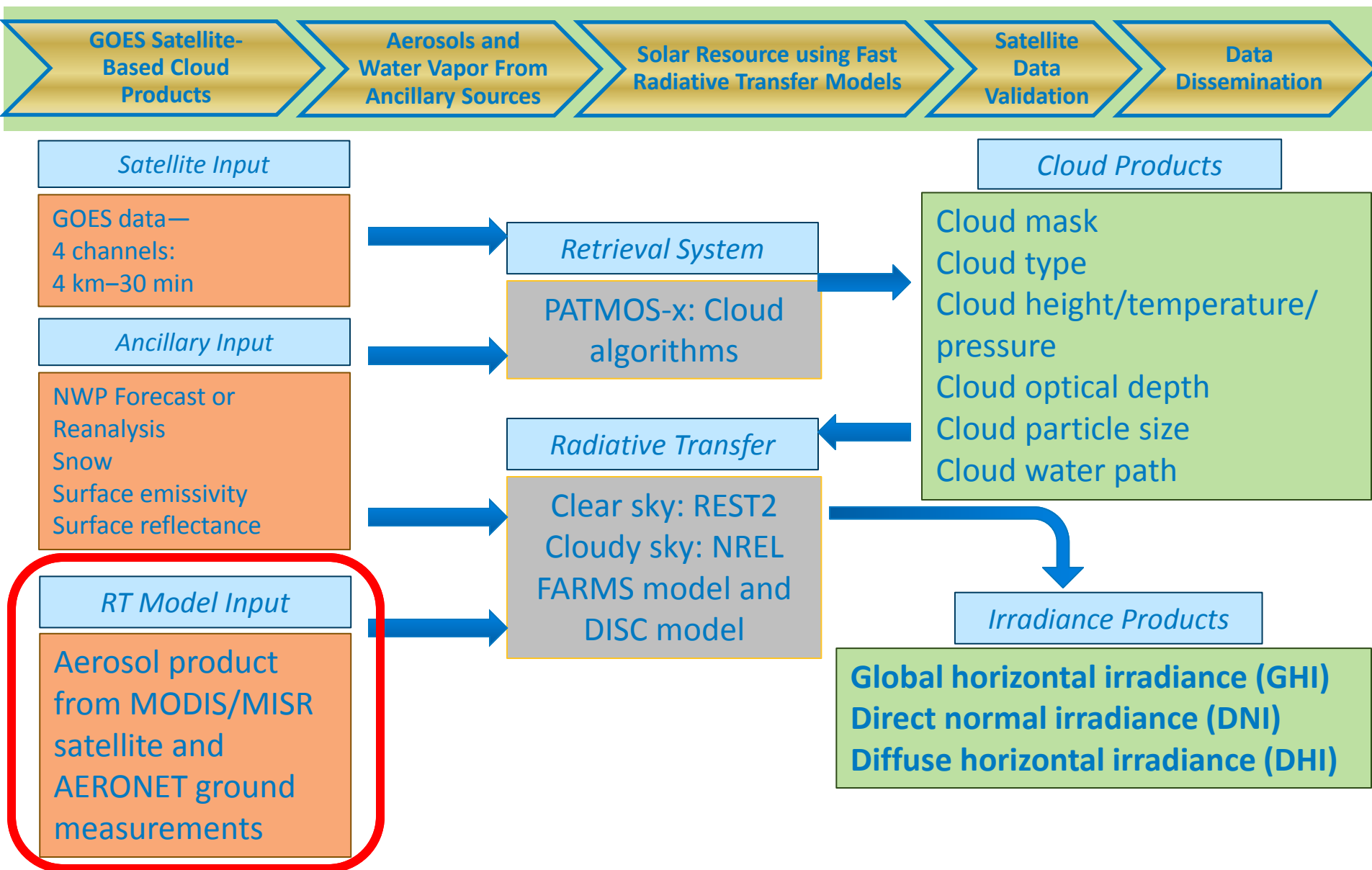


# Cloud Products for PSM

- In collaboration with the University of Wisconsin, NREL developed an improved version of the PATMOS-x processing system, which was used to process GOES-WEST and -EAST data for years 1998-2014
- Cloud properties:
  - Cloud mask
  - Cloud type
  - Cloud height/temperature/pressure
  - Cloud optical depth
  - Cloud particle size
  - Cloud water path



# PSM: Aerosols



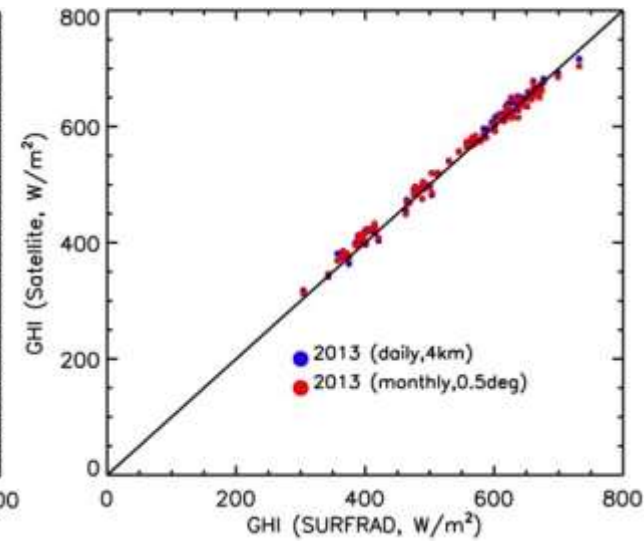
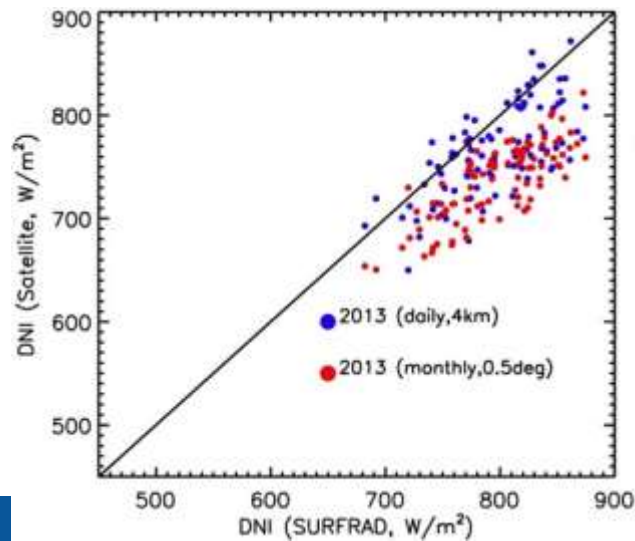
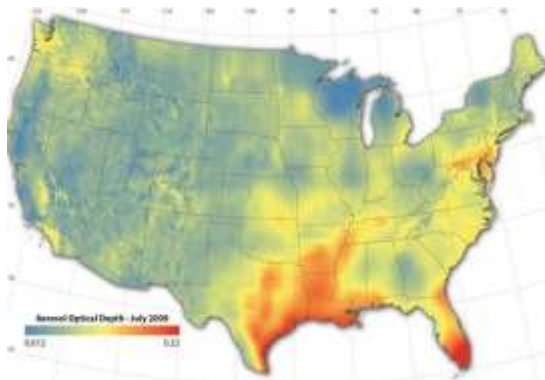


# Aerosols for PSM

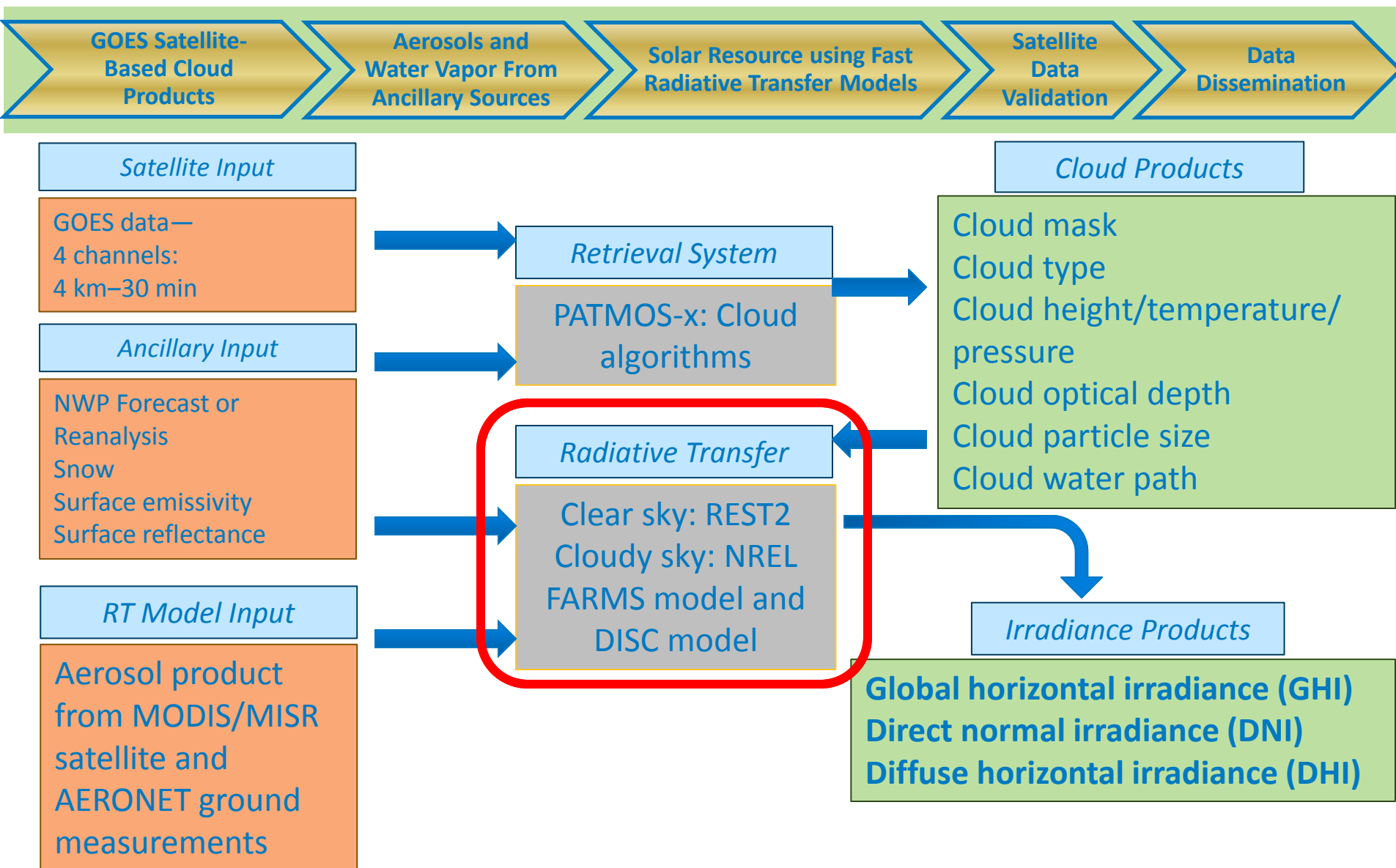
- Developed accurate gridded aerosol product using multiple data sources

- Developed monthly  $0.5^\circ$  aerosol optical depth (AOD) for 1998-2014 using satellite and ground-based measurements
- Monthly results interpolated to form daily 4-km AOD data
- Daily data calibrated using ground measurements to develop accurate AOD product

	AOD	MAE(W/m <sup>2</sup> )	MAE(%)	RMSE(W/m <sup>2</sup> )
Desert Rock, NV	Monthly	17	1.84	20
	Daily	12	1.34	16
Goodwin Creek, MS	Monthly	47	5.96	53
	Daily	30	3.76	36
Bondville, IL	Monthly	62	7.76	67
	Daily	37	4.65	48
Table Mtn., Co	Monthly	35	3.84	41
	Daily	24	2.57	30



# PSM: Radiative Transfer Models

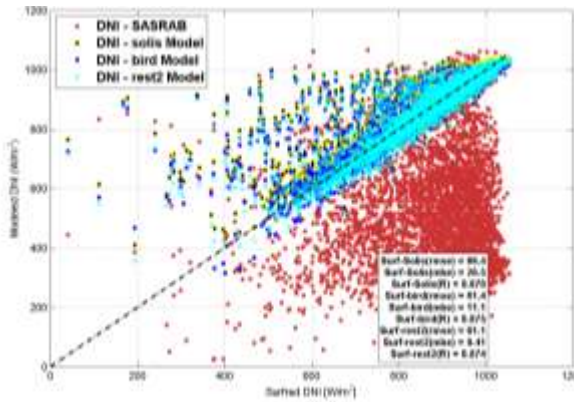
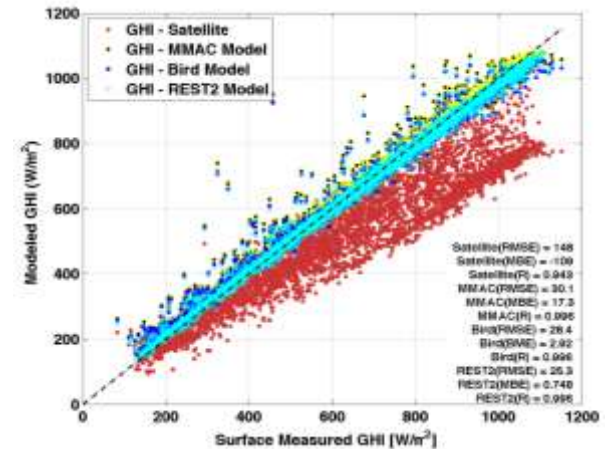




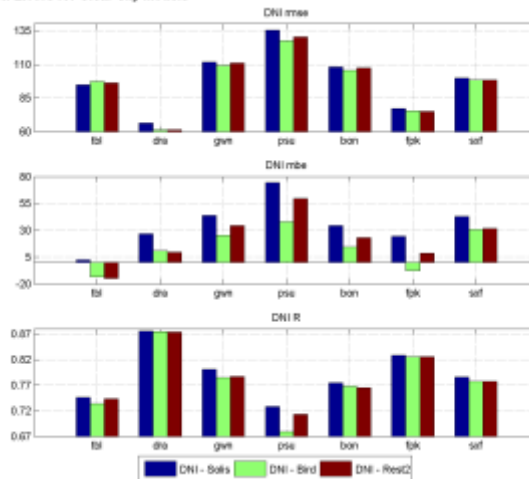
# Clear Sky Radiative Transfer Model for PSM

## REST2 Clear Sky Model Output with Better AOD Input

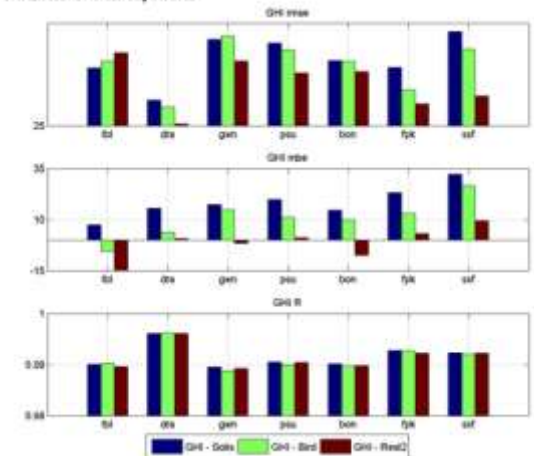
- SASRAB model initially tested but provided biased results
- 3 next-generation models (Bird, MMAC, and REST2 models) tested with high-quality aerosol data
- All models provided significantly accurate results
- REST2 provides the most accurate results and was implemented in the PSM framework



DNI Errors for Clear Sky Models



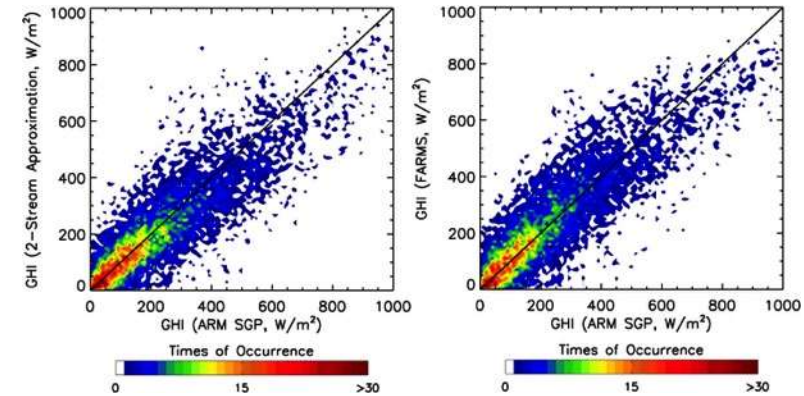
GHI Errors for Clear Sky Models



# All-Sky Radiative Transfer Model for PSM

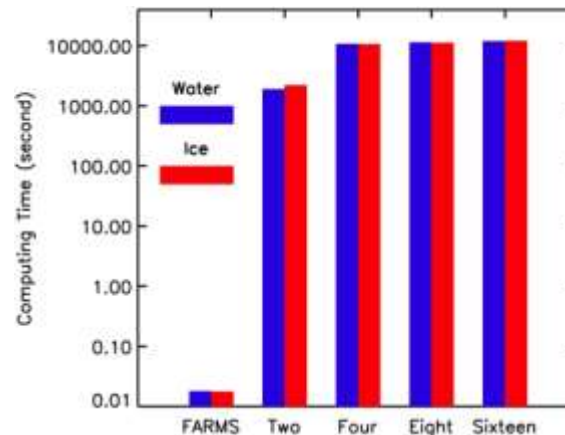
- Fast All-Sky Radiation Model for Solar applications (FARMS)

- Developed new radiative transfer model for use in satellite and forecasting applications
- 2-stream approximation (industry standard) and FARMS have similar performance
- FARMS is 1,000 times more efficient in the computation of solar radiation

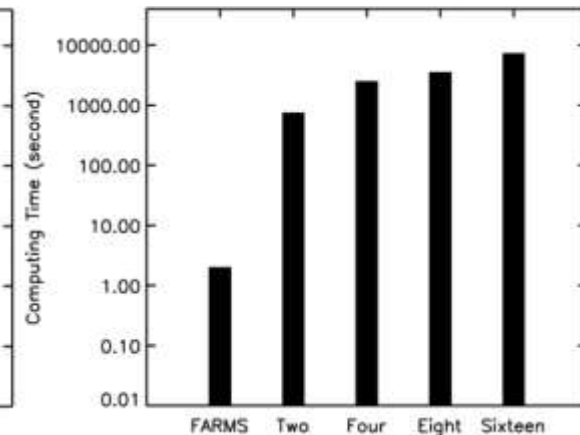


	SASRAB	FARMS
MBE%	5.9	0.4
MAE%	29.9	27.6
MBE (W/m <sup>2</sup> )	16.5	1

Transmittance

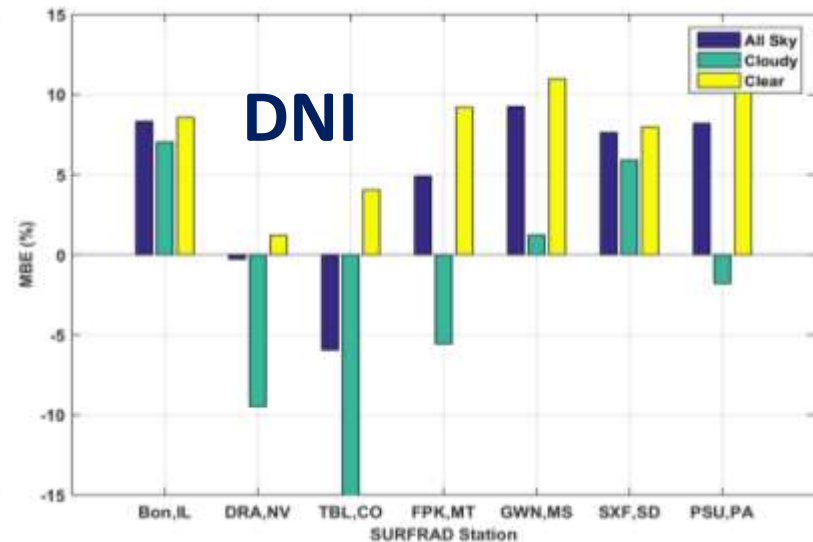
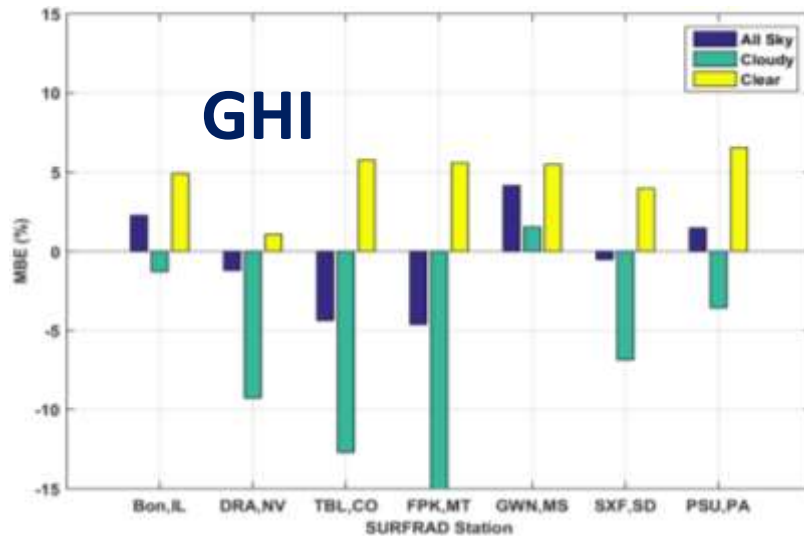


Radiative Transfer

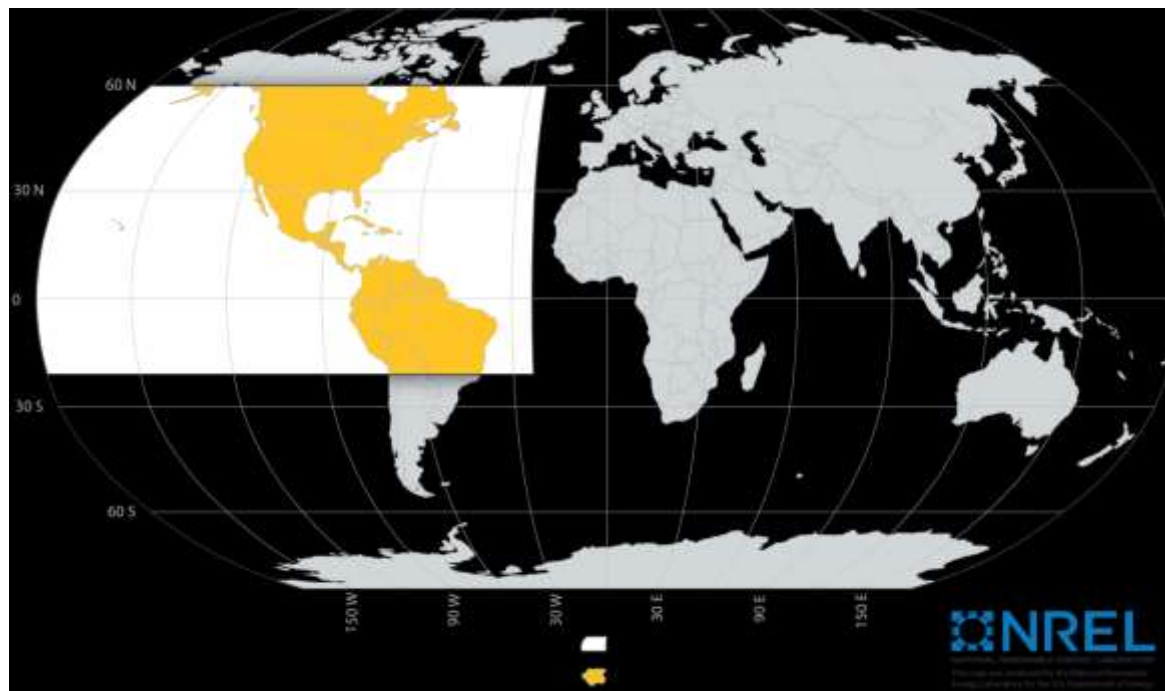


# Validation of the PSM

- Evaluation of the new NSRDB dataset was carried out using high-quality SURFRAD ground stations



MBE in percent for all years (1998-2014) for the seven SURFRAD sites.

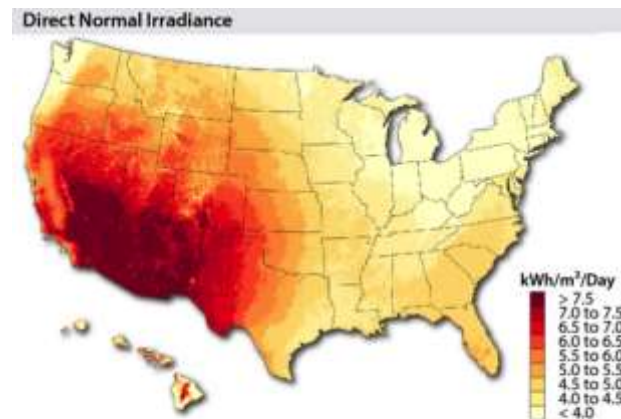
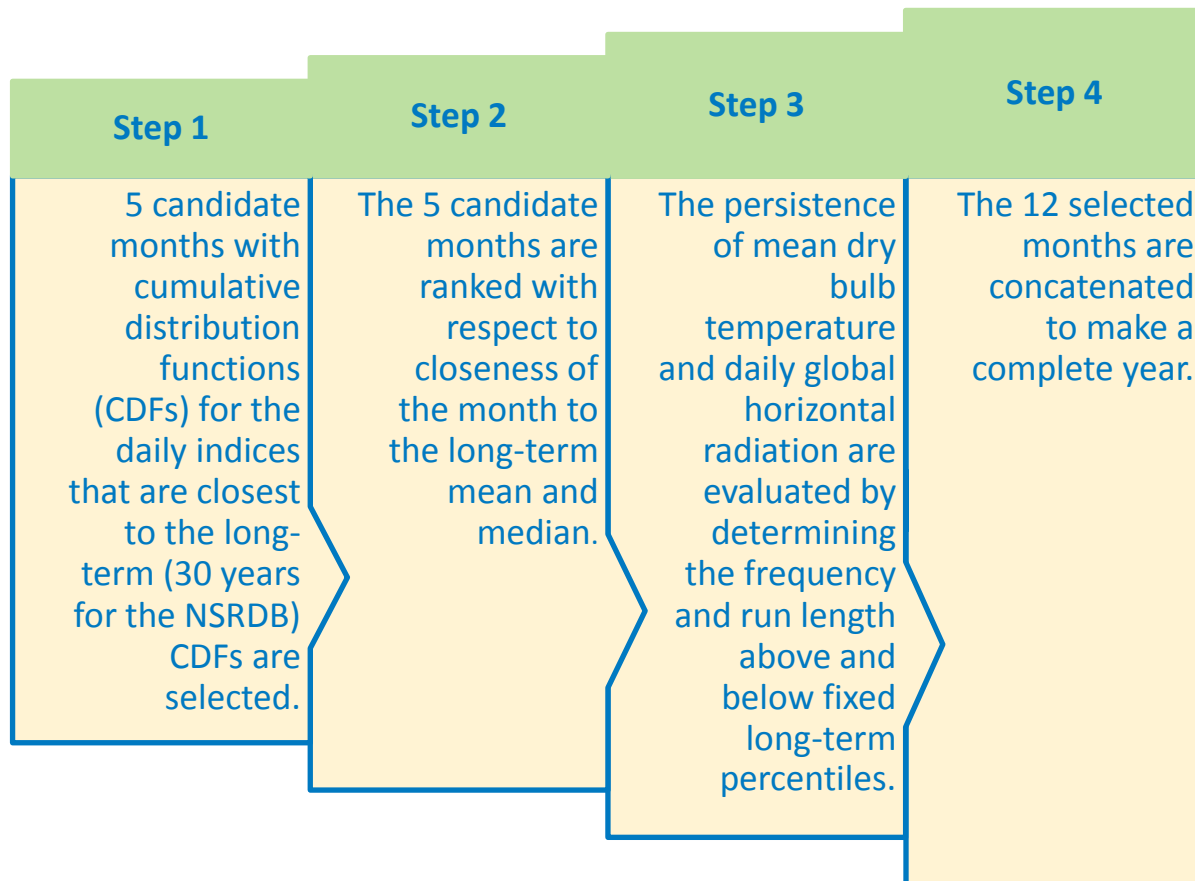


- The area covers 25° W to 175° W and 20° S to 60° N
- Includes **half-hourly** satellite modeled solar data for years 1998-2014 on **4-km** grid
- Time-series solar data for a location can be combined with hourly met data for PV and CSP simulation

# NSRDB Product Variables

Element	Unit	Description
Clearsky DHI	Watt per square meter	- Modeled solar radiation on a horizontal surface received from the sky excluding the solar disk. - <b>This is assuming clear sky condition</b>
Clearsky DNI	Watt per square meter	- Modeled solar radiation obtained from the direction of the sun. - <b>This is assuming clear sky condition</b>
Clearsky GHI	Watt per square meter	- Modeled solar radiation on a horizontal surface received from the sky. - <b>This is assuming clear sky condition</b>
Cloud Type	Unitless	Obtained from PATMOS-X
Dew Point	Degree C	Calculated from specific humidity
DHI	Watt per square meter	Modeled solar radiation on a horizontal surface received from the sky excluding the solar disk.
DNI	Watt per square meter	Modeled solar radiation obtained from the direction of the sun.
GHI	Watt per square meter	Modeled solar radiation on a horizontal surface received from the sky.
Fill Flag	Unitless	'N/A': 0, 'Missing Image': 1, 'Low Irradiance': 2, 'Exceeds Clearsky': 3, 'Missing Cloud Properties': 4, 'Rayleigh Violation': 5
Snow Depth	meters	Source: MERRA
Solar Zenith Angle	Degrees	Angle between the sun and the zenith
Temperature	Degree C	Source: MERRA
Pressure	Millibar	Source: MERRA
Relative Humidity	Percent	Calculated from specific humidity
Precipitable Water	Millimeter	Source: MERRA
Wind Direction	Degrees	Source: MERRA
Wind Speed	meter per second	Source: MERRA

## Gridded TMY - Developed using the gridded NSRDB (1998-2014)



Example figures representing DNI and GHI datasets for TMY developed using meteorological and irradiance weighting factors.

**TMY data sets provide industry standard resource information for:**

- Building design and performance
- Solar heating and cooling systems
- Photovoltaic and concentrating solar power system performance
- Energy systems analysis



# TMY Product Variables

Element	Unit or Description
Year	1998-2014
Month	1-12
Day	1-28,1-30 or 1-31
Hour	1-23
Minute	0
Dew Point	Degree C
DHI	Watt per square meter
DNI	Watt per square meter
GHI	Watt per square meter
Temperature	Degree C
Pressure	Millibar
Wind Direction	Degrees
Wind Speed	meter per second



# NSRDB Website & Data Access

# New NSRDB Website



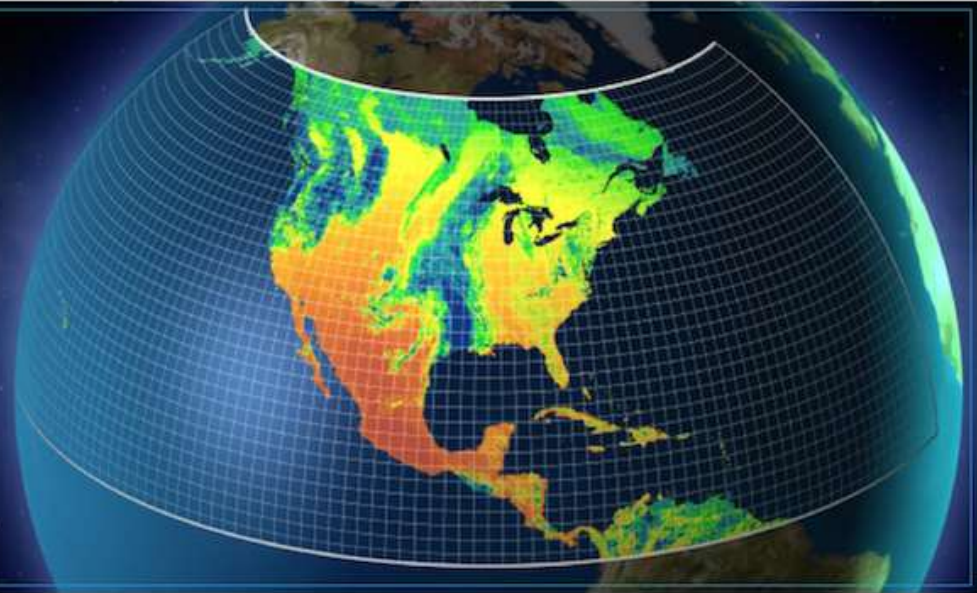
## National Solar Radiation Database (NSRDB)

 [Home](#)[About](#)[Data Sets](#)[Resources](#)[Contact](#)

Scan: Global Horizontal Irradiance  
Location: Earth, North America  
Date: March 21, 2012  
Time: 1200 hours, Mountain Time Zone  
Spatial Resolution: 4 km



analyzing  
Particulate Matter  
Aerosols  
Water Vapor  
Cloud Cover



<http://nsrdb.nrel.gov>

# New NSRDB Website

Learn about the current and historic datasets, TMY, history, and more

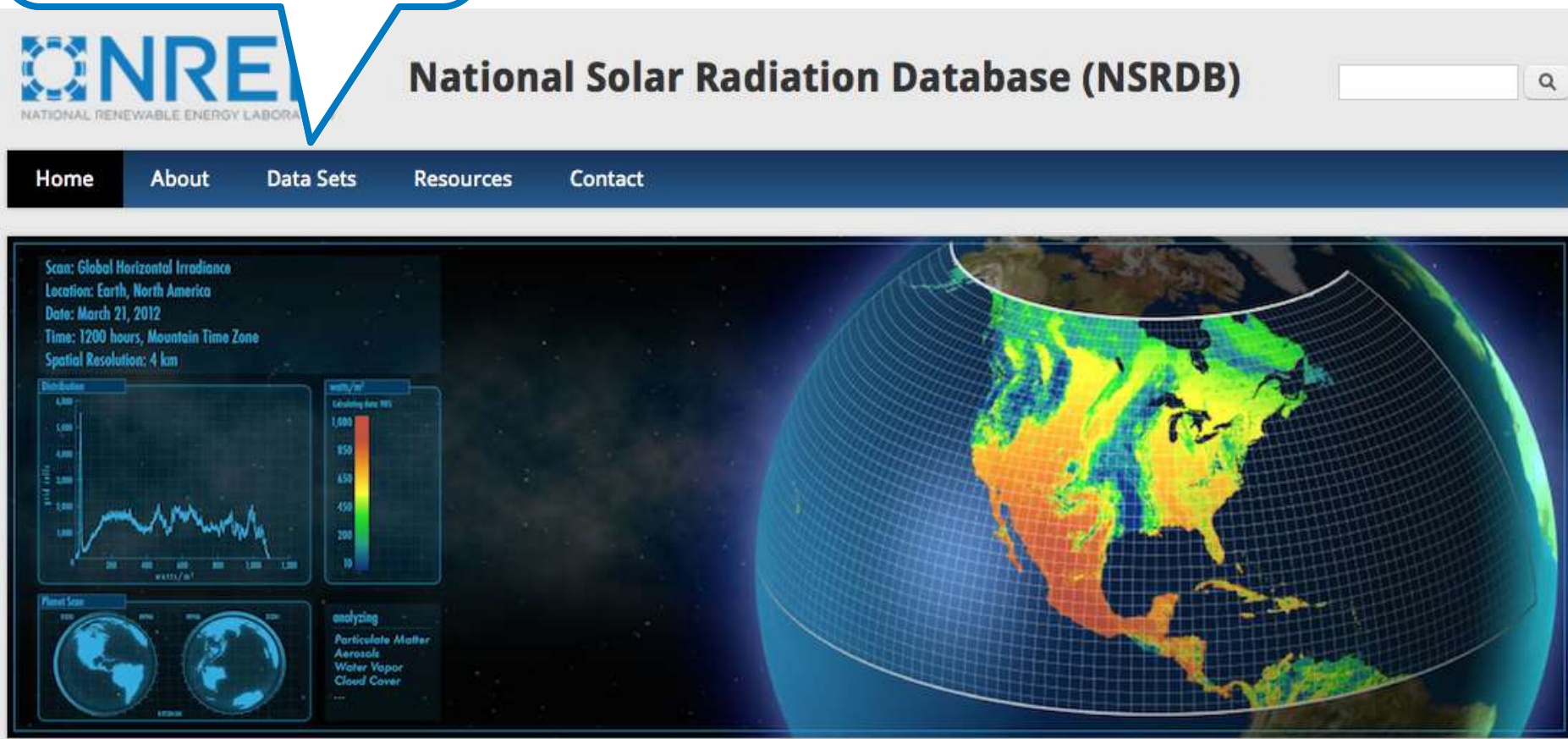


<http://nsrdb.nrel.gov>



# New NSRDB Website

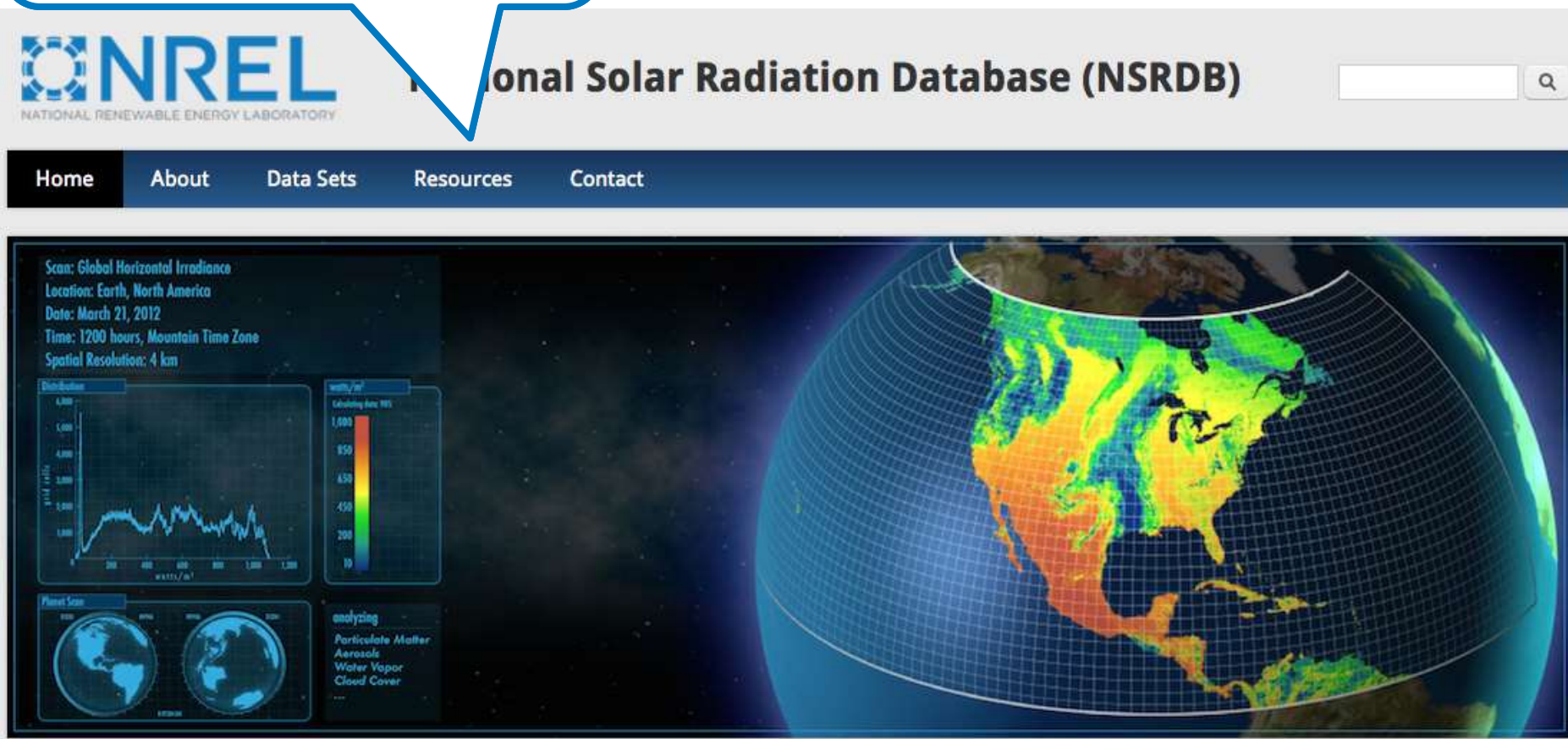
Access the data



<http://nsrdb.nrel.gov>

# New NSRDB Website

Users manuals, helpful links, **publications**, and a user forum

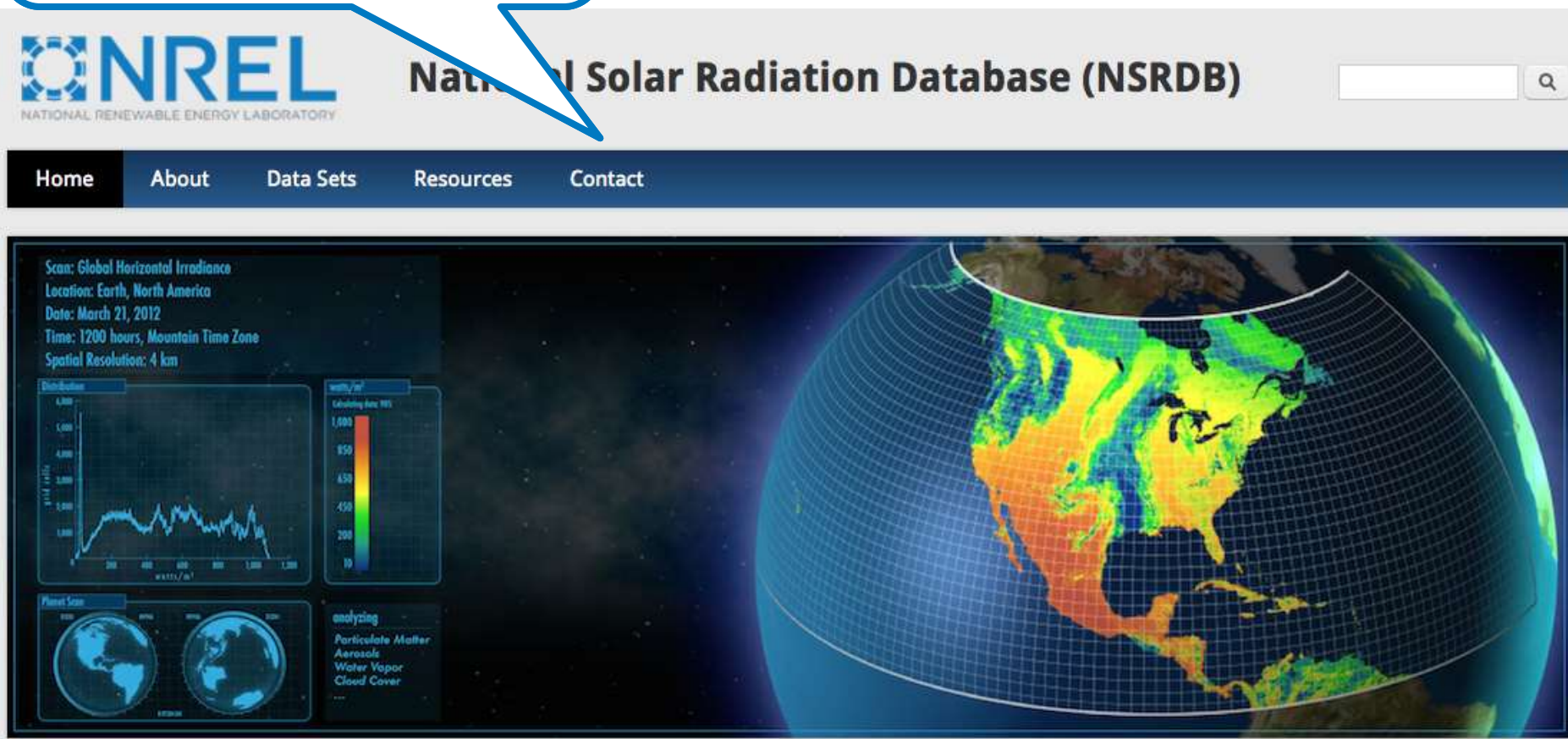


<http://nsrdb.nrel.gov>



# New NSRDB Website

Still have questions?  
Contact us.



<http://nsrdb.nrel.gov>

# New NSRDB Viewer

Select and Query Data

Download Data

NREL

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NSRDB Data Viewer

Home Print Feedback

Data Layers

Legend

Query

▶ Environmental

▶ Infrastructure

▶ Land Ownership

▶ Power Plants

▶ Ground Measurement Sites

▶ NSRDB

▶ Solar Study Areas

▶ State/Local Borders

Change Base Map

⊕ ⊖ ↻

Report a map error

# Browse Data Layers

Select and Query Data Download Data **NREL** NSRDB Data Viewer Home Print Feedback

**Data Layers** Legend Query

- ▶ Environmental
- ▶ Infrastructure
- ▶ Land Ownership
- ▶ Power Plants
- ▶ Ground Measurement Sites
- ▶ NSRDB
- ▶ Solar Study Areas
- ▶ State/Local Borders

Use the layer tree to find and display data layers

Change Base Map

Report a map error



# Browse Data Layers

**Select and Query Data** **Download Data** **NRREL** **NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- ▶ Environmental
- ▶ Infrastructure
- ▶ Land Ownership
- ▶ Power Plants
- ▶ Ground Measurements
- ▶ **NSRDB**
- ▶ Solar Study Areas
- ▶ State/Local Borders

Use the layer tree to find and display data layers

Map showing the United States and Mexico, with various states and cities labeled. The map is overlaid with a grid and a blue line representing a data layer. The Google logo is visible in the bottom left corner of the map area.


# Browse Data Layers

**Select and Query Data** **Download Data** **NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- ▶ Environmental
- ▶ Infrastructure
- ▶ Land Ownership
- ▶ Power Plants
- ▶ Ground Measurement Sites
- ▲ **NSRDB**
  - ☐ MTS1
  - ☐ MTS2
  - ☐ MTS3
  - ☐ PSM Direct Normal Irradiance
  - ☐ PSM Global Horizontal Irradiance
- ▶ Solar Study Areas
- ▶ State/Local Borders

Use the layer tree to find and display data layers



Google

# Browse Data Layers

**Select and Query Data** **Download Data** **NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- NSRDB**
  - ☐ MTS1
  - ☐ MTS2
  - ☐ MTS3
  - ☒ **PSM Direct Normal Irradiance**
  - ☐ PSM Global Horizontal Irradiance
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Use the layer tree to find and display data layers

Change Base Map

Google

Report a map error



# Browse Data Layers

**Select and Query Data** **Download Data** **NSREL** **NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- ▶ Environmental
- ▶ Infrastructure
- ▶ Land Ownership
- ▶ Power Plants
- ▶ Ground Measurement Sites
- ▲ **NSRDB**
  - ☐ MTS1
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Use the layer tree to find and display data layers

Google

Report a map error

# Browse Data Layers

**Select and Query Data** **Download Data** **NREL** **NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- ▲ **NSRDB**
  - ☐ MTS1
  - ☐ MTS2
  - ☒ **MTS3**
  - ☒ **PSM Direct Normal Irradiance**
  - ☐ PSM Global Horizontal Irradiance
- Solar Study Areas
- State/Local Borders

Use the layer tree to find and display data layers

Google



# Browse Data Layers

**Select and Query Data** **Download Data** **NSREL** **NSRDB Data Viewer** [Home](#) [Print](#) [Feedback](#)

**Data Layers** **Legend** **Query**

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- NSRDB
  - MTS1
  - MTS2
  - MTS3
  - PSM Direct Normal Irradiance
  - PSM Global Horizontal Irradiance
- Solar Study Areas
- State/Local Borders

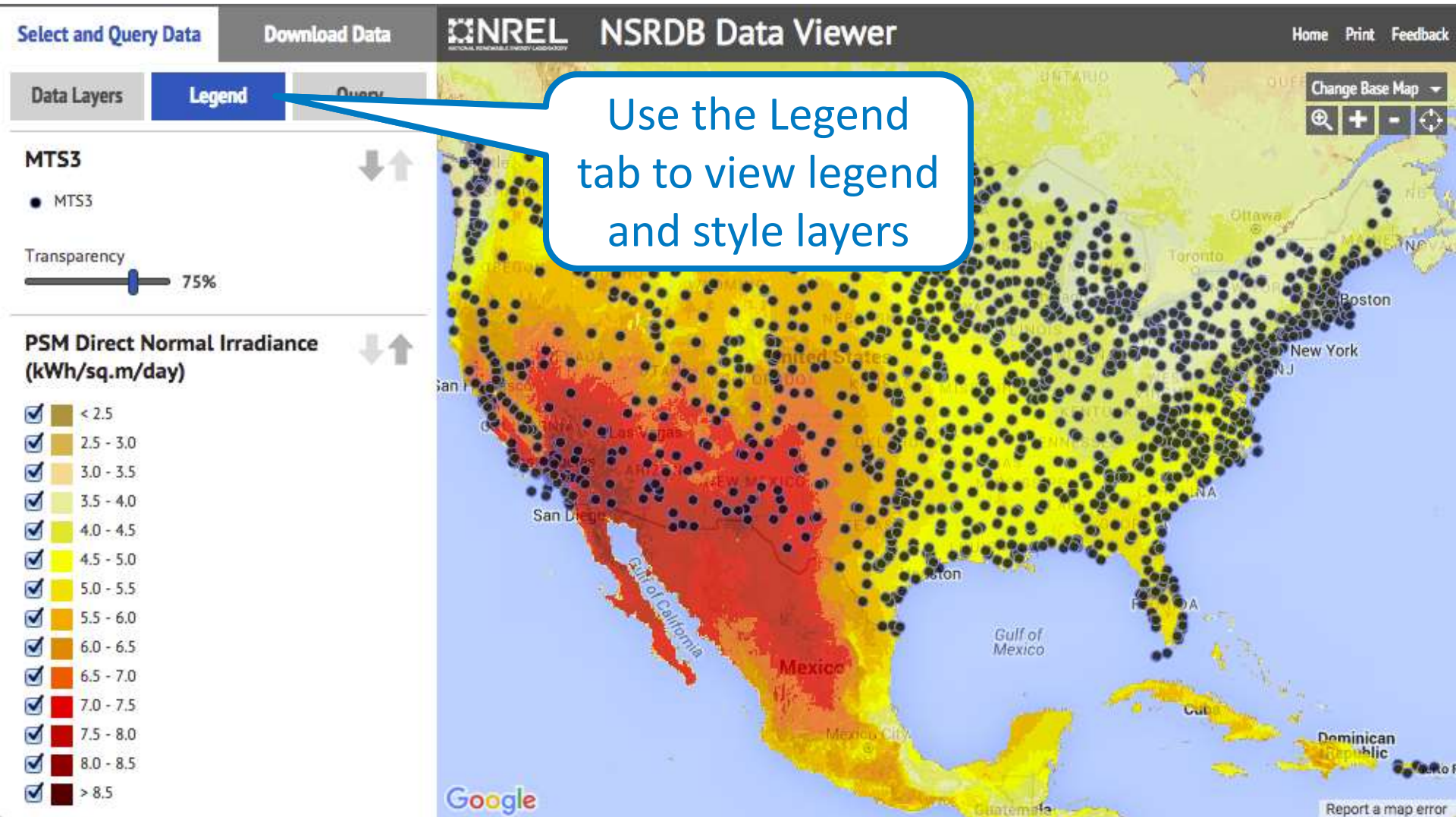
Use the Legend tab to view legend and style layers

Change Base Map

Google

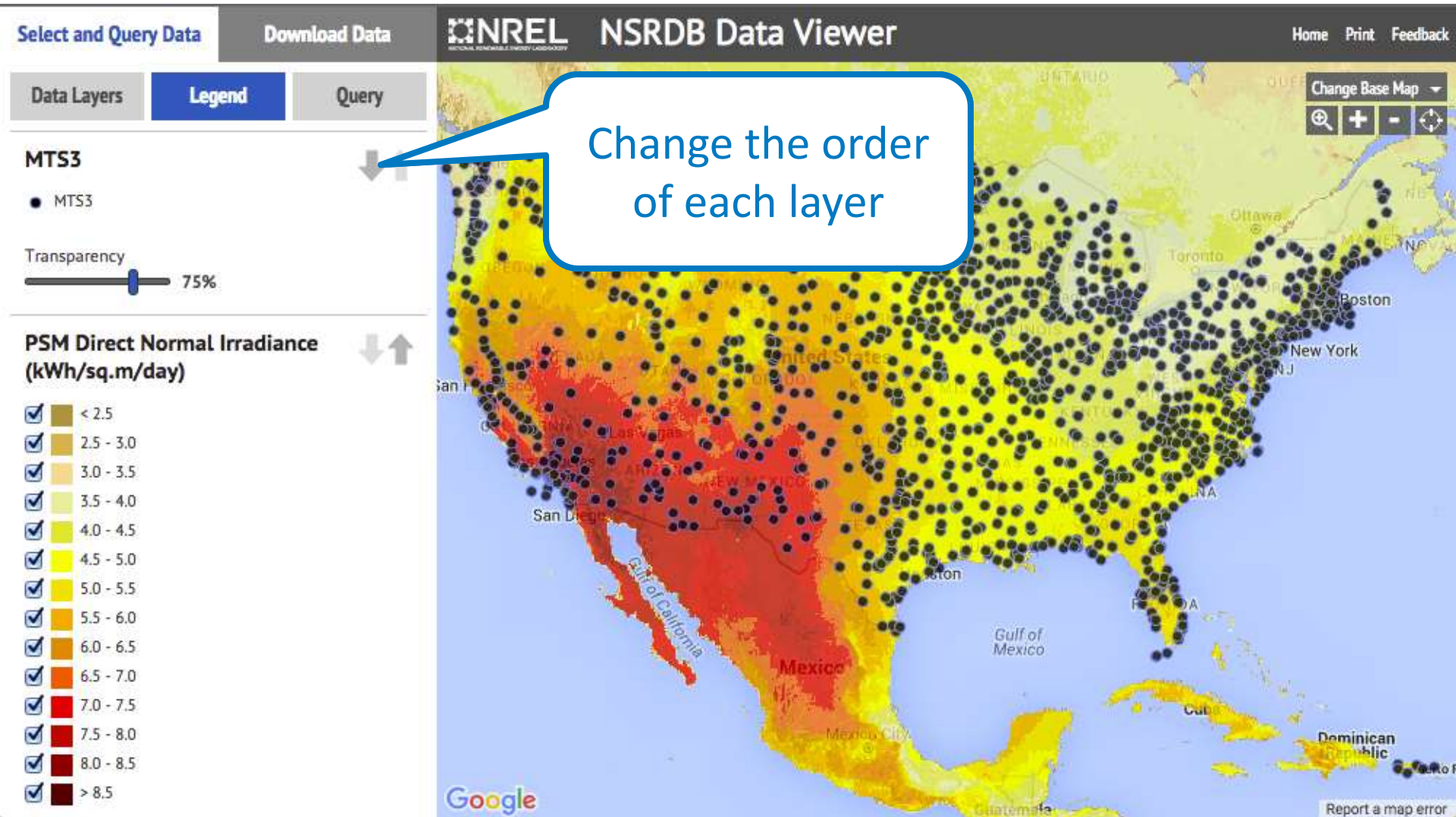
Report a map error

# Browse Data Layers

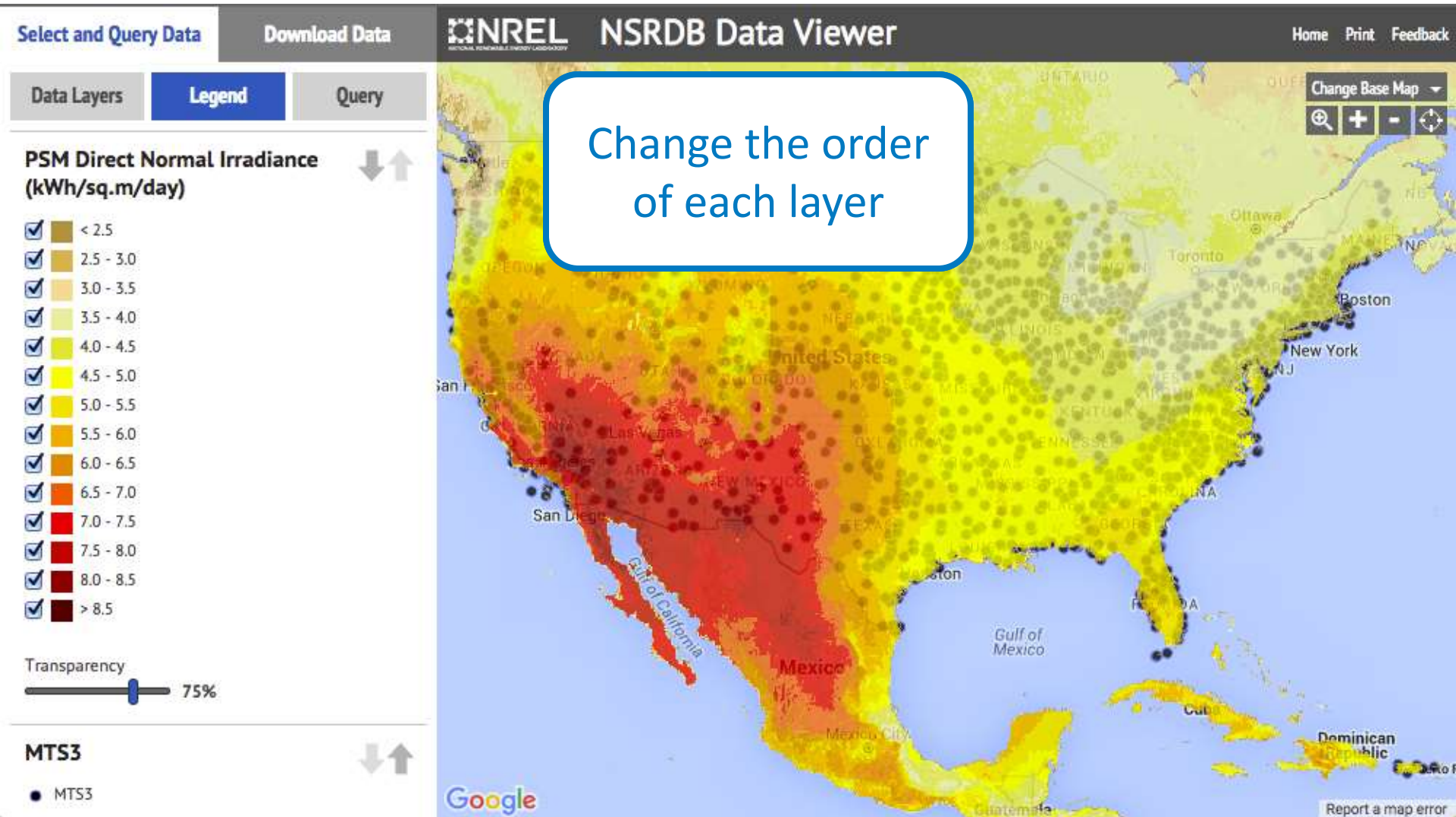




# Browse Data Layers

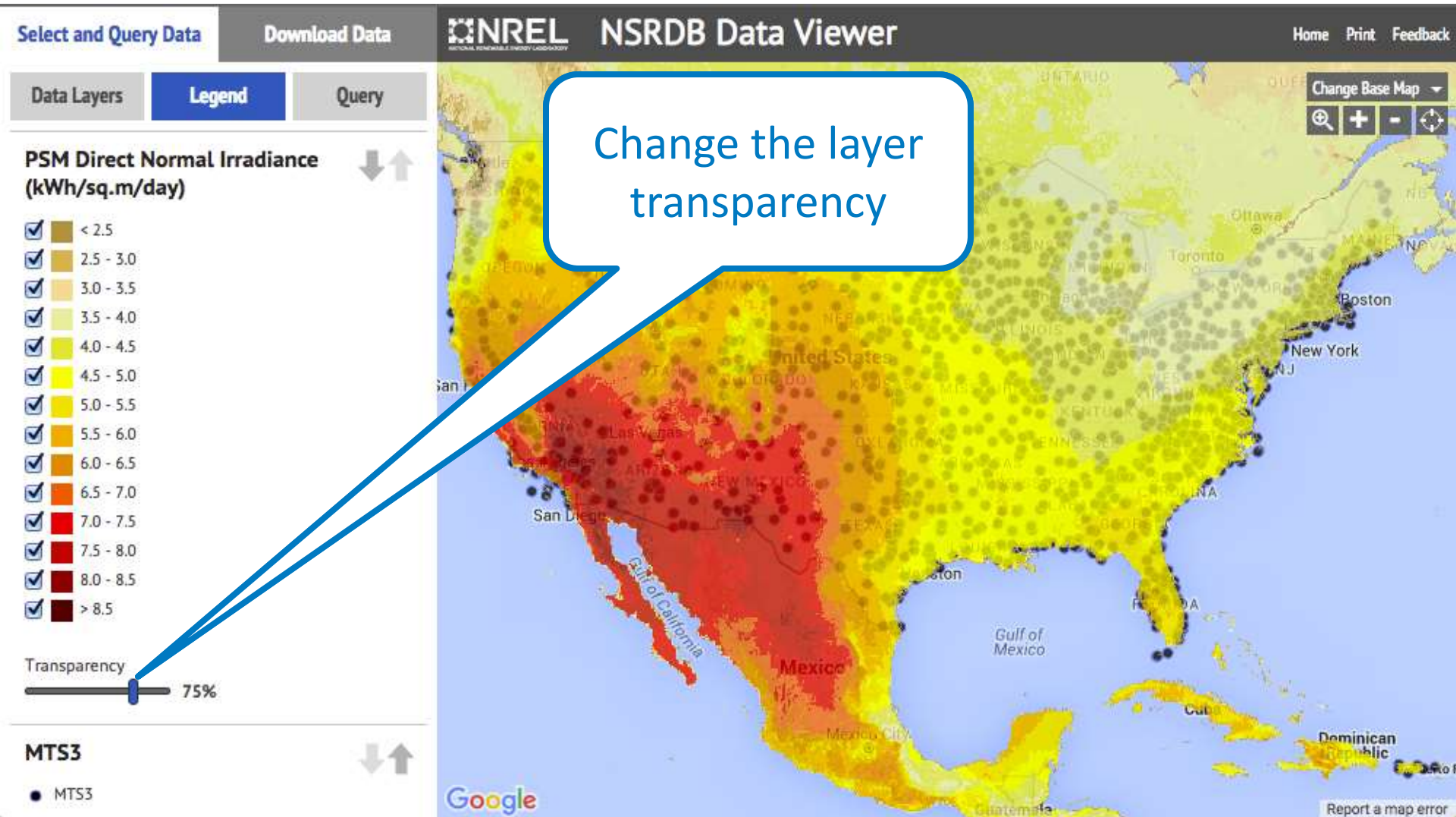


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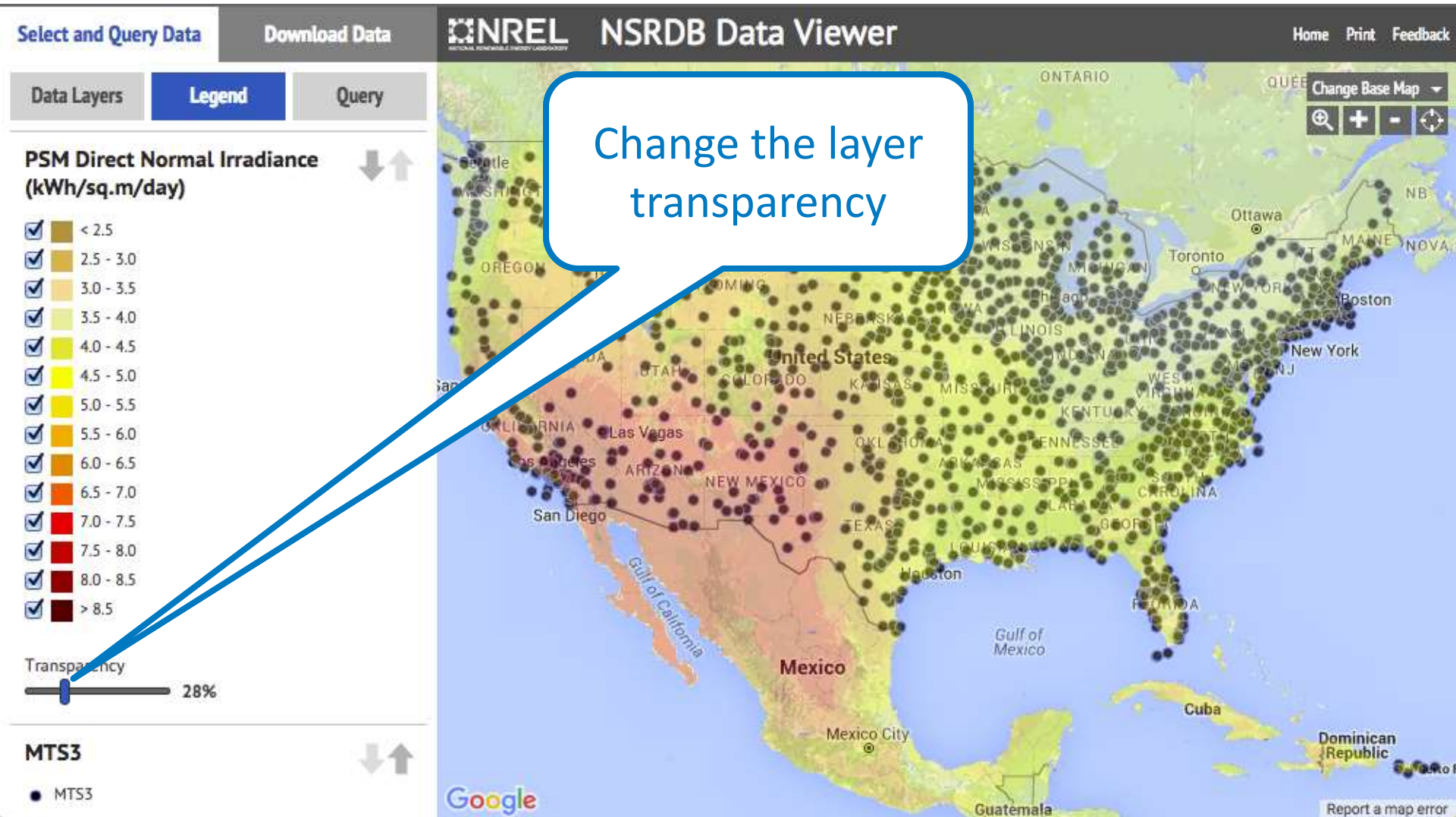




# Browse Data Layers

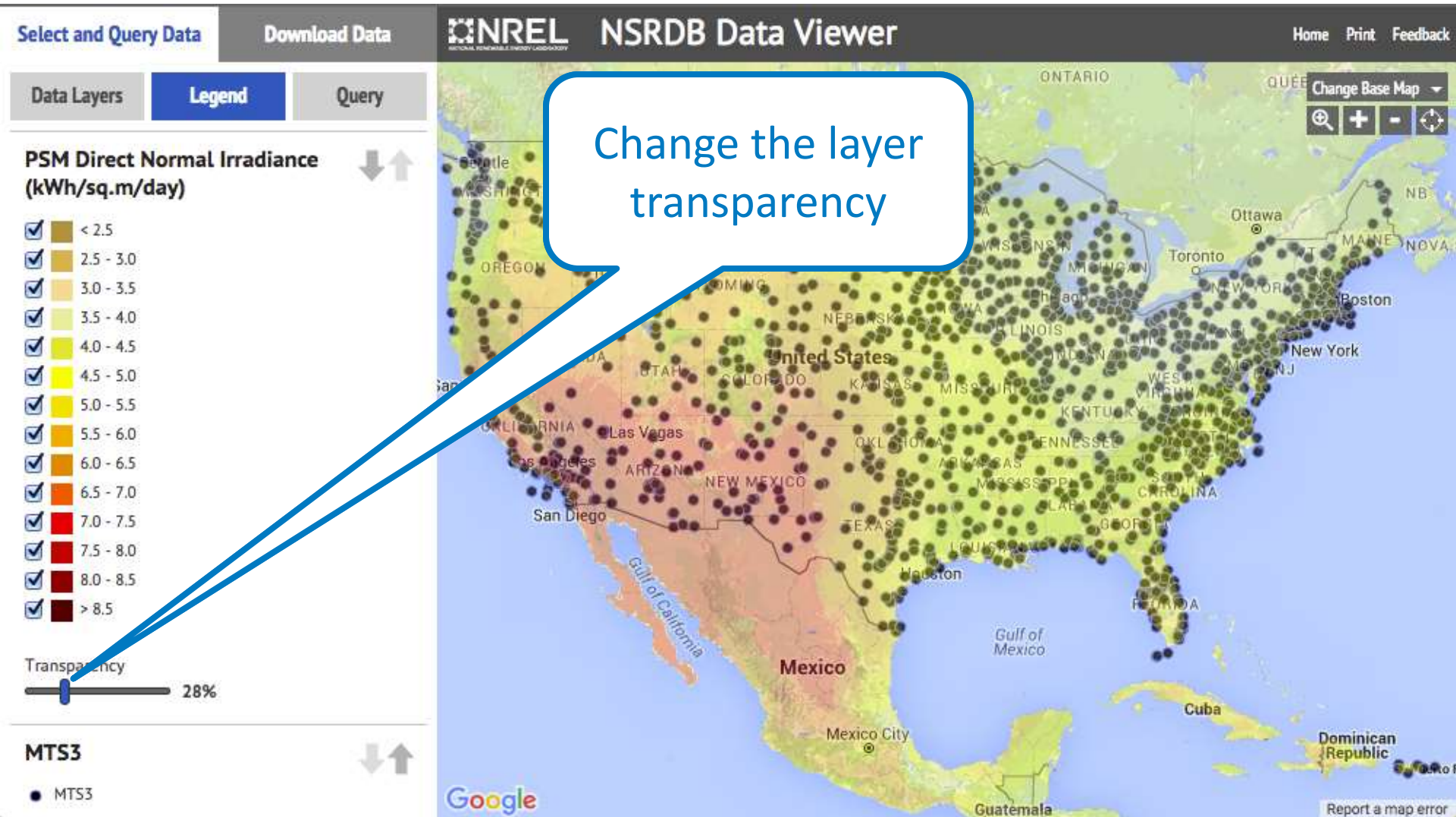


# Browse Data Layers

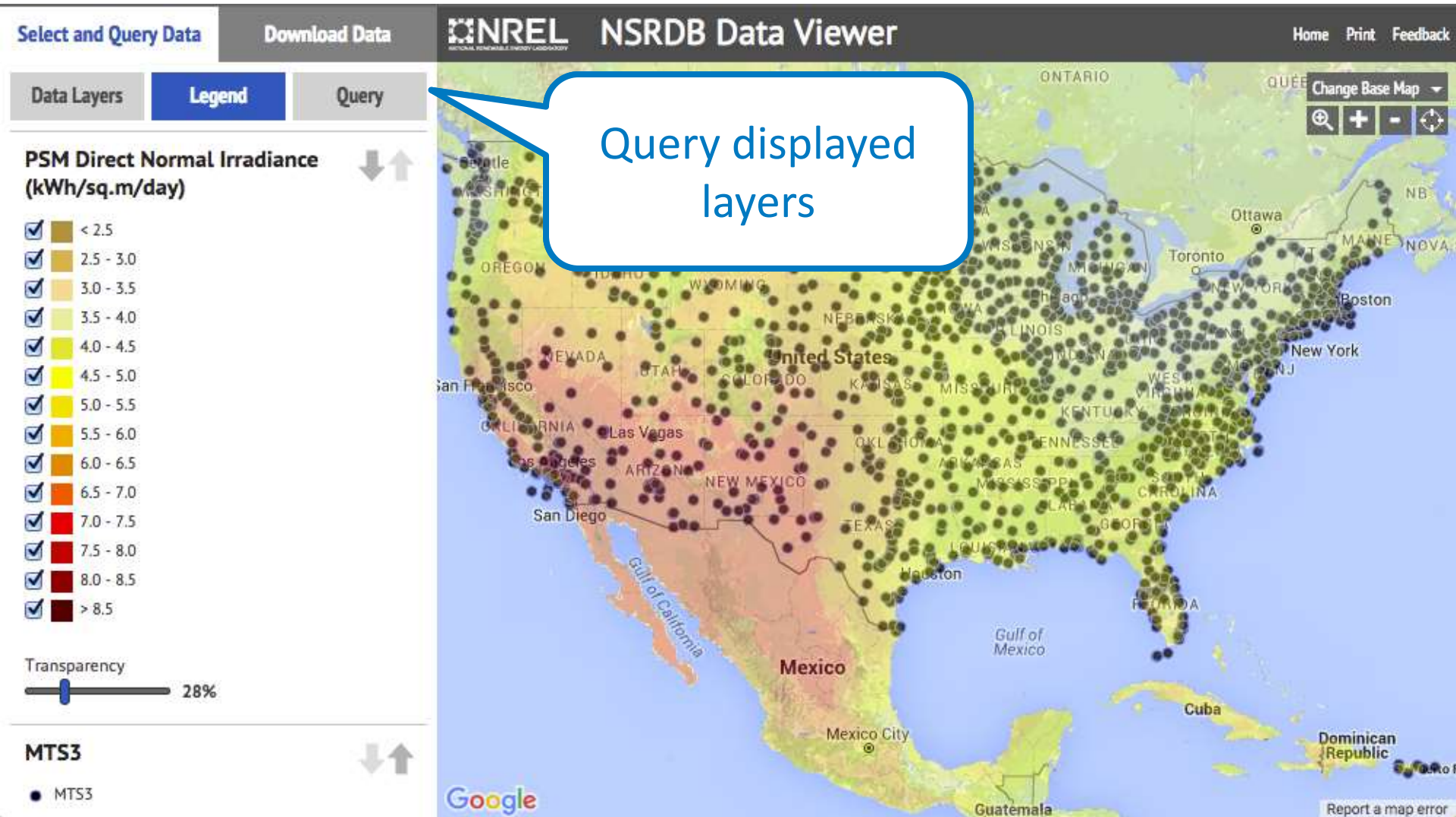




# Browse Data Layers



# Query Data Layers





# Query Data Layers

**Select and Query Data**   **Download Data**   **NREL**   **NSRDB Data Viewer**   Home   Print   Feedback

**Data Layers**   **Legend**   **Query**

**Point Query**  
Select a single point on the map and get data for that location.

**Region Query**  
Select an area on the map and get data for that area.

**Custom Shape Query**  
Draw a custom shape on the map and view data for that area.

**Attribute Query**  
Use this advanced feature to filter your query based on specific attributes.

Query by point...

Google



# Query Data Layers

**Select and Query Data**   **Download Data**   **NREL NSRDB Data Viewer**   Home   Print   Feedback

**Data Layers**   **Legend**   **Query**

**Point Query**  
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**Region Query**  
Select an area on the map and get data for that area.

**Custom Shape Query**  
Draw a custom shape on the map and view data for that area.

**Attribute Query**  
Use this advanced feature to filter your query based on specific attributes.

...rectangle...

The screenshot displays the NREL NSRDB Data Viewer interface. On the left, a sidebar contains four query options: 'Point Query' (with a dot icon), 'Region Query' (with a square icon), 'Custom Shape Query' (with a polygon icon), and 'Attribute Query' (with a magnifying glass icon). A blue speech bubble with the text '...rectangle...' points to the 'Region Query' option. The main area shows a map of North America with a heatmap overlay and numerous black data points. The map includes labels for various locations such as San Francisco, Los Angeles, San Diego, Las Vegas, New Mexico, Texas, Oklahoma, Kansas, Nebraska, Iowa, Missouri, Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Louisiana, Mississippi, Alabama, Georgia, Florida, and the Gulf of Mexico. The Google logo is visible in the bottom left corner of the map area.

# Query Data Layers

Select and Query Data

Download Data

NSREL

NSRDB Data Viewer

Home

Print

Feedback

Data Layers

Legend

Query

**Point Query**

Select a single point on the map and get data for that location.

**Region Query**

Select an area on the map and get data for that area.

**Custom Shape Query**

Draw a custom shape on the map and view data for that area.

**Attribute Query**

Use this advanced feature to filter your query based on specific attributes.

...custom drawn shape...



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45



# Query Data Layers

**Select and Query Data**   **Download Data**   **NREL NSRDB Data Viewer**   Home   Print   Feedback

**Data Layers**   **Legend**   **Query**

**Point Query**  
Select a single point on the map and get data for that location.

**Region Query**  
Select an area on the map and get data for that area.

**Custom Shape Query**  
Draw a custom shape on the map and view data for that area.

**Attribute Query**  
Use this advanced feature to filter your query based on specific attributes.

...or attribute.

The screenshot displays the NREL NSRDB Data Viewer interface. The main map shows North America with a color-coded solar resource overlay (yellow to red) and numerous black dots representing data points. A blue speech bubble with the text "...or attribute." points to the "Attribute Query" option in the sidebar. The sidebar includes four query methods: Point Query, Region Query, Custom Shape Query, and Attribute Query. The top navigation bar includes "Select and Query Data", "Download Data", and the NREL logo. The bottom of the map shows the Google logo and a "Report a map error" link.

# Layer Metadata

The screenshot shows the NSRDB Data Viewer interface. On the left, there is a sidebar with tabs for 'Data Layers', 'Legend', and 'Query'. Under 'Data Layers', the 'NSRDB' section is expanded, showing a list of layers: MTS1, MTS2, MTS3 (checked), PSM Direct Normal Irradiance (checked), and PSM Global Horizontal Irradiance. Below these are 'Solar Study Areas' and 'State/Local Borders'. Each layer has a download icon and an information icon (a question mark inside a circle). A callout box with the text 'View metadata for each layer' points to the information icon for 'PSM Direct Normal Irradiance'. The main area displays a map of the United States and Mexico, with numerous black dots representing data points. The map is color-coded by solar potential, with red indicating higher potential and yellow indicating lower potential. The interface includes a top navigation bar with 'Select and Query Data', 'Download Data', and the 'NSRDB Data Viewer' title. The bottom status bar shows the URL 'localhost:9012/#' and the 'NATIONAL RENEWABLE ENERGY LABORATORY' logo.

Select and Query Data Download Data

NSREL NSRDB Data Viewer

Home Print Feedback

Data Layers Legend Query

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- NSRDB
  - MTS1
  - MTS2
  - MTS3
  - PSM Direct Normal Irradiance
  - PSM Global Horizontal Irradiance
- Solar Study Areas
- State/Local Borders

Information

View metadata for each layer

localhost:9012/#

NATIONAL RENEWABLE ENERGY LABORATORY



# Layer Metadata

The screenshot displays the NREL NSRDB Data Viewer interface. On the left, a sidebar contains a 'Data Layers' section with a list of categories: Environmental, Infrastructure, Land Ownership, Power Plants, Ground Measurement Sites, and NSRDB. The NSRDB section is expanded, showing several layers: MTS1, MTS2, MTS3 (checked), PSM Direct Normal Irradiance (checked), and PSM Global Horizontal Irradiance. Below these are 'Solar Study Areas' and 'State/Local Borders'. The main map area shows a yellow-toned map of the United States with black dots representing data points. A white callout box with a blue border points to the map, containing the text 'View metadata for each layer'. A modal window titled 'Average Annual DNI Grid' is open, providing detailed metadata for the selected layer. The modal text describes the data as monthly and annual average daily total solar resource, averaged over 0.038-degree surface cells, and mentions the use of AVHRR Pathfinder Atmospheres-Extended (PATMOS-x) algorithms.

**Select and Query Data** **Download Data** **NREL** **NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- ▲ **NSRDB**
  - ☐ MTS1
  - ☐ MTS2
  - ☒ **MTS3**
  - ☒ **PSM Direct Normal Irradiance**
  - ☐ PSM Global Horizontal Irradiance
- Solar Study Areas
- State/Local Borders

**Average Annual DNI Grid**

This data provides monthly average and annual average daily total solar resource averaged over surface cells of 0.038 degrees in both latitude and longitude, or nominally 4 km in size. The solar radiation values represent the resource available to solar energy systems. The data was created using cloud properties which are generated using the AVHRR Pathfinder Atmospheres-Extended (PATMOS-x) algorithms. Fast all-

View metadata for each layer

Report a map error



# Layer Downloads

The screenshot displays the NREL NSRDB Data Viewer interface. The top navigation bar includes 'Select and Query Data', 'Download Data', and the NREL logo. The left sidebar contains a 'Data Layers' panel with a list of categories: Environmental, Infrastructure, Land Ownership, Power Plants, Ground Measurement Sites, NSRDB (expanded), Solar Study Areas, and State/Local Borders. Under the NSRDB section, 'MTS3' and 'PSM Direct Normal Irradiance' are checked, while 'MTS1', 'MTS2', and 'PSM Global Horizontal Irradiance' are unchecked. A 'Download' button is visible next to the checked layers. The main map area shows a map of the United States and Mexico with numerous black dots representing solar data points. A blue callout box with the text 'Download layers' points to the 'Download' button. The bottom of the interface shows the URL 'https://maps.nrel.gov/nsrdb-viewer/#' and the Google logo.

**Select and Query Data** **Download Data** **NREL** NSRDB Data Viewer [Home](#) [Print](#) [Feedback](#)

**Data Layers** **Legend** **Query**

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- NSRDB
  - ☐ MTS1
  - ☐ MTS2
  - ☒ MTS3
  - ☒ PSM Direct Normal Irradiance
  - ☐ PSM Global Horizontal Irradiance
- Solar Study Areas
- State/Local Borders

**Download**

**Download layers**

<https://maps.nrel.gov/nsrdb-viewer/#>

# Layer Downloads

The screenshot displays the NSRDB Data Viewer interface. On the left, a sidebar contains tabs for 'Select and Query Data', 'Download Data', 'Legend', and 'Query'. Under 'Data Layers', the 'NSRDB' section is expanded, showing a list of layers: MTS1, MTS2, MTS3 (checked), PSM Direct Normal Irradiance (checked), and PSM Global Horizontal Irradiance. A modal window titled 'MTS3' is open, displaying the text 'Download map layer data in the following geospatial data formats:' and four buttons: CSV, Shapefile, KML, and GeoJSON. A blue callout box with the text 'Download layers' points to the map area. The map shows a solar resource map of the United States and Mexico, with numerous black dots representing data points. The background is a Google Map of the United States and Mexico.

**NSRDB Data Viewer**

Home Print Feedback

Select and Query Data Download Data

Data Layers Legend Query

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- NSRDB
  - MTS1
  - MTS2
  - MTS3
  - PSM Direct Normal Irradiance
  - PSM Global Horizontal Irradiance
- Solar Study Areas
- State/Local Borders

**MTS3**

Download map layer data in the following geospatial data formats:

CSV Shapefile KML GeoJSON

Download layers



# NSRDB Data Downloads



# NSRDB Data Download

**Select and Query Data** **Download Data** **NSREL NSRDB Data Viewer** Home Print Feedback

**Data Layers** Legend Query

- Environmental
- Infrastructure
- Land Ownership
- Power Plants
- Ground Measurement Sites
- NSRDB**
  - MTS1
  - MTS2
  - ☒ MTS3
  - ☒ PSM Direct Normal Irradiance
  - ☐ PSM Global Horizontal Irradiance

Download from NSRDB database

The screenshot displays the NSRDB Data Viewer interface. The main map shows the United States and Mexico, with numerous black dots representing data points. The sidebar on the left allows users to select data layers, including Environmental, Infrastructure, Land Ownership, Power Plants, Ground Measurement Sites, and NSRDB. The NSRDB section is expanded, showing options for MTS1, MTS2, MTS3 (selected), PSM Direct Normal Irradiance (selected), and PSM Global Horizontal Irradiance. A blue callout box points to the 'Download Data' tab and the 'NSRDB' data layer, with the text 'Download from NSRDB database'. The top of the interface includes the 'NSREL NSRDB Data Viewer' title and navigation links for Home, Print, and Feedback. The bottom of the interface includes the Google logo and a 'Report a map error' link.



# NSRDB Data Download

Select and Query Data

Download Data

Download Solar Resource Data By Point

Select a location on the map by clicking once. You will then be presented with a variety of download choices.

Download Solar Resource Data By Region

Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

NSREL

NATIONAL RENEWABLE ENERGY LABORATORY

NSRDB Data Viewer

Home Print Feedback

Change Base Map

+

-

+

-

Report a map error

Download from  
NSRDB database

# NSRDB Data Download

Select and Query Data

Download Data

Download Solar Resource Data By Point

Select a location on the map by clicking once. You will then be presented with a variety of download choices.

Download Solar Resource Data By Region

Use the drawing tool to draw a rectangle over the desired region. You will then be presented with a variety of download choices.

NSREL

NSRDB Data Viewer

Home Print Feedback

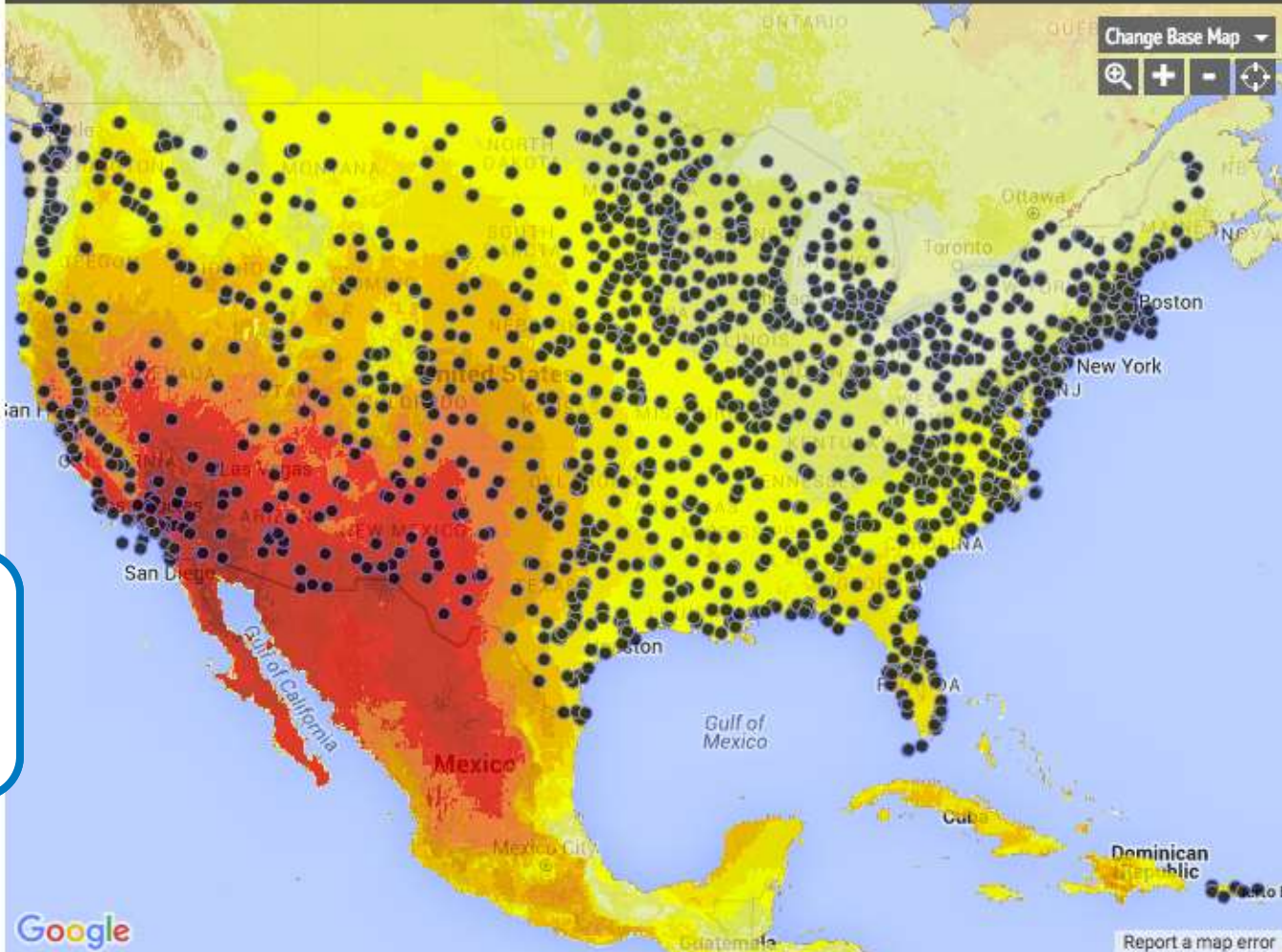
Change Base Map

+

-

+

-



Report a map error

Download by point location



# NSRDB Data Download

The screenshot shows the NSRDB Data Viewer interface. A modal window titled "Data Download Information Form" is open, overlaying a map of the United States. The modal contains the following text and form fields:

**Data Download Information Form**

Please fill out the following information in order to utilize the data download tool. This information helps us to justify improvements to the tool.

**Note: All fields are required.**

**Full Name:**

**Email:**

**Organization/Affiliation:**

☒ Please keep me informed of future releases and publications related to the NSRDB Data Viewer.

**Planned Use:**

**Continue**

Enter information  
(required for  
downloads)



# NSRDB Data Download

Select and Query Data

Download Data

Download Solar Resource Data By Point

Select a location on the map by clicking once. You will then be presented with a variety of download choices.

Download Solar Resource Data By Region

Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

NREL NSRDB Data Viewer

Home Print Feedback

Change Base Map

Click map to place marker

Select a point location

# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. The 'Select Years' section is highlighted with a blue callout bubble. The interface includes tabs for PSM, MTS3, MTS2, and MTS1. The 'Select Years' section has buttons for 'Select All' and 'Clear All', and a grid of checkboxes for years from 1998 to 2014. The 'Select Attributes' section has buttons for 'Select All' and 'Clear All', and a list of attributes with checkboxes. The 'Download Options' section has checkboxes for 'Convert UTC to Local Time' and 'Half Hour Intervals'. A 'Download Limit Indicator' bar is at the bottom.

**Select and Query Data** **Download Data** **NREL NSRDB Data Viewer** Home Print Feedback

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**Select Years** **Select All** **Clear All**

☐ 1998 ☐ 1999 ☐ 2000 ☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ 2006 ☐ 2007

☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014

**Select Attributes** **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

<input checked="" type="checkbox"/> DNI	<input type="checkbox"/> GHI
<input type="checkbox"/> Clear Sky DNI	<input type="checkbox"/> Clear Sky GHI
<input checked="" type="checkbox"/> Dew Point	<input checked="" type="checkbox"/> Temperature
<input checked="" type="checkbox"/> Relative Humidity	<input type="checkbox"/> Solar Zenith Angle
<input type="checkbox"/> Snow Depth	<input type="checkbox"/> Wind Direction
<input type="checkbox"/> Fill Flag	

**Download Options**

☐ Convert UTC to Local Time ☒ Half Hour Intervals

**Download Data** **Download Limit Indicator**

Choose years to download

# NSRDB Data Download

The screenshot displays the NREL NSRDB Data Viewer interface. The 'Select Years' section is highlighted with a blue callout bubble. The interface includes tabs for PSM, MTS3, MTS2, and MTS1. The 'Select Years' section has 'Select All' and 'Clear All' buttons, followed by a grid of year checkboxes from 1998 to 2014. The 'Select Attributes' section below it lists various solar and weather parameters with checkboxes. The 'Download Options' section includes checkboxes for 'Convert UTC to Local Time' and 'Half Hour Intervals'. A 'Download Data' button and a 'Download Limit Indicator' progress bar are at the bottom.

**Select and Query Data** **Download Data** **NREL NSRDB Data Viewer** Home Print Feedback

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**Select Years** **Select All** **Clear All**

☒ 1998 ☐ 1999 ☐ 2000 ☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ 2006 ☐ 2007

☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014

**Select Attributes** **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

<input checked="" type="checkbox"/> DNI	<input type="checkbox"/> GHI
<input type="checkbox"/> Clear Sky DNI	<input type="checkbox"/> Clear Sky GHI
<input checked="" type="checkbox"/> Dew Point	<input checked="" type="checkbox"/> Temperature
<input checked="" type="checkbox"/> Relative Humidity	<input type="checkbox"/> Solar Zenith Angle
<input type="checkbox"/> Snow Depth	<input type="checkbox"/> Wind Direction
<input type="checkbox"/> Fill Flag	

**Download Options**

☐ Convert UTC to Local Time ☒ Half Hour Intervals

**Download Data** **Download Limit Indicator**

Choose years to download



# NSRDB Data Download

The screenshot displays the NREL NSRDB Data Viewer interface. The main window is titled "NREL NSRDB Data Viewer" and features a sidebar on the left with navigation options: "Select and Query Data" and "Download Data". The "Download Data" section is active, showing options for "Download Solar Resource Data By Point" and "Download Solar Resource Data By Region".

The main content area is divided into several sections for data selection:

- PSM** (Selected): MTS3, MTS2, MTS1
- Select Years**: Includes buttons for "Select All" and "Clear All". A grid of years from 1998 to 2014 is shown, with 1998 selected.
- Select Attributes**: Includes buttons for "Select All" and "Clear All". A note states: "The minimum required attributes for the SAM PV and CSP models have been selected by default." A list of attributes is shown with checkboxes: DHI, Clear Sky DHI, Cloud Type, Pressure, Total Precipitable Water, Wind Speed, DNI, Clear Sky DNI, Dew Point, Relative Humidity, Snow Depth, Fill Flag, GHI, Clear Sky GHI, Temperature, Solar Zenith Angle, and Wind Direction. A blue callout bubble points to this section with the text "Select attributes to download".
- Select Download**: Includes checkboxes for "Include L", "Convert UTC to Local Time", and "Half Hour Intervals".
- Download Limit Indicator**: A progress bar at the bottom of the selection window.

# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. On the left, there are two panels: 'Download Solar Resource Data By Point' and 'Download Solar Resource Data By Region'. The main area displays a map of the United States with a data point selected. A modal window titled 'NSRDB Data Viewer' is open, showing options for data selection. The modal has tabs for 'PSM', 'MTS3', 'MTS2', and 'MTS1'. Under 'Select Years', there are 'Select All' and 'Clear All' buttons, followed by a grid of year checkboxes from 1998 to 2014. Under 'Select Attributes', there are 'Select All' and 'Clear All' buttons, followed by a list of attributes with checkboxes. A blue callout box points to the 'Select All' buttons for both years and attributes. At the bottom of the modal, there are 'Download Options' including 'Map Day', 'Convert UTC to Local Time', and 'Half Hour Intervals'. A 'Download Limit Indicator' bar is also present.

**Select all attributes and/or years**

# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. The 'Select Years' section has a 'Select All' button highlighted by a blue callout bubble. The 'Select Attributes' section also has a 'Select All' button highlighted by the same bubble. The interface includes tabs for PSM, MTS3, MTS2, and MTS1. The 'Select Years' section lists years from 1998 to 2014, all of which are selected. The 'Select Attributes' section lists various attributes, with a note indicating that the minimum required attributes for the SAM PV and CSP models have been selected by default. The 'Download Options' section includes checkboxes for 'Convert UTC to Local Time' and 'Half Hour Intervals'. A 'Download Limit Indicator' bar is visible at the bottom.

**Select and Query Data** **Download Data** **NREL NSRDB Data Viewer** Home Print Feedback

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**Select Years** **Select All** **Clear All**

☒ 1998 ☒ 1999 ☒ 2000 ☒ 2001 ☒ 2002 ☒ 2003 ☒ 2004 ☒ 2005 ☒ 2006 ☒ 2007  
☒ 2008 ☒ 2009 ☒ 2010 ☒ 2011 ☒ 2012 ☒ 2013 ☒ 2014

**Select Attributes** **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

☒ DHI ☒ DNI ☐ GHI  
☐ Clear Sky DHI ☐ Clear Sky DNI ☐ Clear Sky GHI  
☐ Clouds ☒ Dew Point ☒ Temperature  
☒ Precipitation ☒ Relative Humidity ☐ Solar Zenith Angle  
☐ Total Water Vapor ☐ Snow Depth ☐ Wind Direction  
☒ Fill Flag

**Download Options**  
☐ Leap Day ☐ Convert UTC to Local Time ☒ Half Hour Intervals

**Data** **Download Limit Indicator**

Select all  
attributes and/or  
years



# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. On the left, there are three panels: 'Select and Query Data', 'Download Data', and 'Download Solar Resource Data By Point'. The 'Download Data' panel is active, showing a map of the United States with a red rectangle indicating the selected region. The 'Download Solar Resource Data By Point' panel is also visible, showing a list of download choices. The main panel, 'NSRDB Data Viewer', displays a form for selecting data. It includes tabs for 'PSM', 'MTS3', 'MTS2', and 'MTS1'. The 'Select Years' section has a 'Select All' button and a 'Clear All' button. Below this, there are checkboxes for years from 1998 to 2014. The 'Select Attributes' section has a 'Select All' button and a 'Clear All' button. Below this, there are checkboxes for various attributes: DHI, Clear Sky DHI, Cloud Type, Pressure, Total Water, Wind, DNI, Clear Sky DNI, Dew Point, Relative Humidity, Snow Depth, Fill Flag, GHI, Clear Sky GHI, Temperature, Solar Zenith Angle, and Wind Direction. The 'Download Options' section has checkboxes for 'Convert UTC to Local Time' and 'Half Hour Intervals'. At the bottom, there is a 'Download Limit Indicator' bar. A blue callout box with a pointer to the 'Clear All' buttons contains the text: 'Clear all attributes and/or years'.

Clear all attributes and/or years

# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. On the left, there are three panels: 'Select and Query Data', 'Download Data', and 'Download Solar Resource Data By Point'. The 'Download Data' panel is active, showing a map of the United States with a red rectangle indicating a selected region. The 'Download Solar Resource Data By Point' panel is also visible, showing a list of download choices. The main panel, 'NSRDB Data Viewer', is a modal window with tabs for PSM, MTS3, MTS2, and MTS1. It contains sections for 'Select Years' (with 'Select All' and 'Clear All' buttons), 'Select Attributes' (with 'Select All' and 'Clear All' buttons), and 'Download Options' (with 'Convert UTC to Local Time' and 'Half Hour Intervals' checkboxes). A 'Download Limit Indicator' bar is at the bottom. A blue callout box with a pointer to the 'Clear All' buttons contains the text: 'Clear all attributes and/or years'.

Select and Query Data

Download Data

Download Solar Resource Data By Point

Download Solar Resource Data By Region

NSRDB Data Viewer

PSM MTS3 MTS2 MTS1

Select Years **Select All** **Clear All**

☐ 1998 ☐ 1999 ☐ 2000 ☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ 2006 ☐ 2007

☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014

Select Attributes **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

☒ DHI ☒ DNI ☐ GHI

☐ Clear Sky DHI ☐ Clear Sky DNI ☐ Clear Sky GHI

☐ Cloud Type ☒ Dew Point ☒ Temperature

☒ Pressure ☒ Relative Humidity ☐ Solar Zenith Angle

☐ Total Water Vapor ☐ Snow Depth ☐ Wind Direction

☒ Wind Speed ☐ Fill Flag

Select Download Options

☐ Convert UTC to Local Time ☒ Half Hour Intervals

Download Limit Indicator

Clear all attributes and/or years

# NSRDB Data Download

Select and Query Data Download Data

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**INREL NSRDB Data Viewer**

Home Print Feedback

Change Base Map

PSM MTS3 MTS2 MTS1

Select Years **Select All** **Clear All**

☐ 1998 ☐ 1999 ☐ 2000 ☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ 2006 ☐ 2007

☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014

Select Attributes **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

<input checked="" type="checkbox"/> DHI	<input checked="" type="checkbox"/> DNI	<input type="checkbox"/> GHI
<input type="checkbox"/> Clear Sky DHI	<input type="checkbox"/> Clear Sky DNI	<input type="checkbox"/> Clear Sky GHI
<input type="checkbox"/> Cloud Type	<input checked="" type="checkbox"/> Dew Point	<input checked="" type="checkbox"/> Temperature
<input checked="" type="checkbox"/> Pressure	<input checked="" type="checkbox"/> Relative Humidity	<input type="checkbox"/> Solar Zenith Angle
<input type="checkbox"/> Total Precipitable Water	<input type="checkbox"/> Snow Depth	<input type="checkbox"/> Wind Direction
<input checked="" type="checkbox"/> Wind Speed	<input type="checkbox"/> Fill Flag	

Select Download Options

☐ Include Leap Day ☐ Convert UTC to Local Time ☒ Half Hour Intervals

**Download**

Download Limit Indicator

Include leap day



# NSRDB Data Download

The screenshot displays the NREL NSRDB Data Viewer interface. The 'Download Data' modal window is open, showing the following options:

- Select Years:** Buttons for 'Select All' and 'Clear All'. A grid of checkboxes for years from 1998 to 2014.
- Select Attributes:** Buttons for 'Select All' and 'Clear All'. A note states: 'The minimum required attributes for the SAM PV and CSP models have been selected by default.' A grid of checkboxes for attributes: DHI, Clear Sky DHI, Cloud Type, Pressure, Total Precipitable Water, Wind Speed, DNI, Clear Sky DNI, Dew Point, Relative Humidity, Snow Depth, Fill Flag, GHI, Clear Sky GHI, Temperature, Solar Zenith Angle, and Wind Direction.
- Select Download Options:** A grid of checkboxes: 'Include Leap Day', 'Convert UTC to Local Time', and 'Half Hour Intervals'.

A blue callout bubble points to the 'Convert UTC to Local Time' checkbox, with the text: 'Convert data from UTC to Local Time'.

# NSRDB Data Download

Select and Query Data Download Data

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**INREL NSRDB Data Viewer**

Home Print Feedback

Change Base Map

PSM MTS3 MTS2 MTS1

Select Years **Select All** **Clear All**

☐ 1998 ☐ 1999 ☐ 2000 ☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ 2006 ☐ 2007

☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014

Select Attributes **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

<input checked="" type="checkbox"/> DHI	<input checked="" type="checkbox"/> DNI	<input type="checkbox"/> GHI
<input type="checkbox"/> Clear Sky DHI	<input type="checkbox"/> Clear Sky DNI	<input type="checkbox"/> Clear Sky GHI
<input type="checkbox"/> Cloud Type	<input checked="" type="checkbox"/> Dew Point	<input checked="" type="checkbox"/> Temperature
<input checked="" type="checkbox"/> Pressure	<input checked="" type="checkbox"/> Relative Humidity	<input type="checkbox"/> Solar Zenith Angle
<input type="checkbox"/> Total Precipitable Water	<input type="checkbox"/> Snow Depth	<input type="checkbox"/> Wind Direction
<input checked="" type="checkbox"/> Wind Speed	<input type="checkbox"/> Fill Flag	

Select Download Options

☐ Include Leap Day ☐ Convert UTC to Local Time ☒ Half Hour Intervals

**Download Data**

Uncheck to  
download hourly  
data

# NSRDB Data Download

The screenshot displays the NREL NSRDB Data Viewer interface. A modal window titled "PSM" is open, allowing users to select data attributes and years. The window includes tabs for "PSM", "MTS3", "MTS2", and "MTS1". Under the "PSM" tab, there are sections for "Select Years" (with buttons "Select All" and "Clear All") and "Select Attributes" (with buttons "Select All" and "Clear All"). The "Select Attributes" section lists various solar and weather parameters, many of which are checked by default. Below these sections is a "Download Options" section with checkboxes for "Leap Day", "Convert UTC to Local Time", and "Half Hour Intervals". At the bottom, there is a "Download Data" button and a "Download Limit Indicator" bar. A blue callout box with the text "Select from PSM..." points to the "PSM" tab.

Select from PSM...



# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. On the left, there are two panels: "Download Solar Resource Data By Point" and "Download Solar Resource Data By Region". The main area displays a modal window for data selection. At the top of the modal, there are tabs for "PSM", "MTS3", "MTS2", and "MTS1". The "MTS3" tab is selected. Below the tabs, there are sections for "Select Years" and "Select Attributes". The "Select Years" section has buttons for "Select All" and "Clear All", followed by a grid of checkboxes for years from 1991 to 2010. The "Select Attributes" section has a note that the minimum required attributes for the SAM PV and CSP models have been selected by default. It lists various attributes with checkboxes: DNI, GHI, Temperature, Pressure, Humidity, ETR, ETRN, Broadband AOD, and Wind Speed. The "Download Options" section includes checkboxes for "Include Uncertainty" and "Include Leap Day". At the bottom, there is a "Download Data" button and a "Download Limit Indicator" field. A blue callout bubble points to the "MTS3" tab with the text "...MTS3...".

...MTS3...

# NSRDB Data Download

The screenshot shows the NREL NSRDB Data Viewer interface. On the left, there are two panels: "Download Solar Resource Data By Point" and "Download Solar Resource Data By Region". The main area displays a map of the United States with a data point selected. A modal window is open, showing the "MTS2" tab selected. The modal contains sections for "Select Years", "Select Attributes", and "Select Download Options". A blue callout bubble points to the "MTS2" tab with the text "...MTS2...".

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**NREL NSRDB Data Viewer**

Home | Print | Feedback

Change Base Map

PSM MTS3 **MTS2** MTS1

Select Years **Select** Clear All

☐ 1991 ☐ 1992 ☐ 1993 ☐ 1994 ☐ 1995 ☐ 1996 ☐ 1997 ☐ 1998 ☐ 1999 ☐ 2000

☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ TMY3

Select Attributes **Select All** Clear All

The minimum required attributes for the SAM PV and CSP models have been selected by default.

☒ DHI ☒ DNI ☐ GHI

☒ Dew Point ☒ Temperature ☒ Pressure

☒ Relative Humidity ☐ ETR ☐ ETRN

☐ Precipitation ☐ Broadband AOD ☒ Wind Speed

Select Download Options

☐ Include Uncertainty ☐ Include Leap Day

Download Limit Indicator

...MTS2...

# NSRDB Data Download

The screenshot displays the NREL NSRDB Data Viewer interface. On the left, there are two panels: "Download Solar Resource Data By Point" and "Download Solar Resource Data By Region". The main area shows a map of the United States with a blue rectangle highlighting a region in the Southwest. A modal window titled "NSRDB Data Viewer" is open, showing the "MTS1" dataset selection options. The "Select Years" section has a grid of checkboxes for years from 1961 to 1990, with "Select All" and "Clear All" buttons. The "Select Attributes" section has a grid of checkboxes for various solar resource parameters, with "Select All" and "Clear All" buttons. The "Download Options" section has checkboxes for "Include Uncertainty" and "Include Leap Day". A "Download Limit Indicator" bar is at the bottom of the modal. A blue callout box with the text "...or MTS1 datasets" points to the "MTS1" tab in the modal.

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**NSRDB Data Viewer**

PSM MTS3 MTS2 **MTS1**

**Select Years** **Select All** **Clear All**

<input type="checkbox"/> 1961	<input type="checkbox"/> 1962	<input type="checkbox"/> 1963	<input type="checkbox"/> 1964	<input type="checkbox"/> 1965	<input type="checkbox"/> 1966	<input type="checkbox"/> 1967	<input type="checkbox"/> 1968	<input type="checkbox"/> 1969	<input type="checkbox"/> 1970
<input type="checkbox"/> 1971	<input type="checkbox"/> 1972	<input type="checkbox"/> 1973	<input type="checkbox"/> 1974	<input type="checkbox"/> 1975	<input type="checkbox"/> 1976	<input type="checkbox"/> 1977	<input type="checkbox"/> 1978	<input type="checkbox"/> 1979	<input type="checkbox"/> 1980
<input type="checkbox"/> 1981	<input type="checkbox"/> 1982	<input type="checkbox"/> 1983	<input type="checkbox"/> 1984	<input type="checkbox"/> 1985	<input type="checkbox"/> 1986	<input type="checkbox"/> 1987	<input type="checkbox"/> 1988	<input type="checkbox"/> 1989	<input type="checkbox"/> 1990

☒ TMY2

**Select Attributes** **Select All** **Clear All**

The minimum required attributes for the SAM PV and CSP models have been selected by default.

<input checked="" type="checkbox"/> DHI	<input checked="" type="checkbox"/> DNI	<input type="checkbox"/> GHI
<input type="checkbox"/> ETR	<input type="checkbox"/> ETRN	<input type="checkbox"/> Total Sky Cover
<input type="checkbox"/> Opacity	<input checked="" type="checkbox"/> Dew Point	<input checked="" type="checkbox"/> Temperature
<input checked="" type="checkbox"/> Precipitation	<input checked="" type="checkbox"/> Relative Humidity	<input type="checkbox"/> Wind Direction
<input checked="" type="checkbox"/> Visibility	<input type="checkbox"/> Visibility	<input type="checkbox"/> Ceiling Height
<input type="checkbox"/> Water	<input type="checkbox"/> Broadband AOD	

**Download Options**

<input type="checkbox"/> Include Uncertainty	<input type="checkbox"/> Include Leap Day
--	---

Download Limit Indicator

...or MTS1 datasets



# NSRDB Data Download

Select and Query Data Download Data

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

**INREL NSRDB Data Viewer**

Home Print Feedback

Change Base Map

PSM MTS3 MTS2 MTS1

Select Years [Select All](#) [Clear All](#)

☐ 1991 ☐ 1992 ☐ 1993 ☐ 1994 ☐ 1995 ☐ 1996 ☐ 1997 ☐ 1998 ☐ 1999 ☐ 2000

☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☒ TMY3

Select Attributes [Select All](#) [Clear All](#)

The minimum required attributes for the SAM PV and CSP models have been selected by default.

☒ DHI ☒ Air Temperature ☐ GHI

☒ Dew Point ☐ Relative Humidity ☒ Pressure

☒ Relative Humidity ☐ ETR ☐ ETRN

☐ Precipitable water ☐ Broadband AOD ☒ Wind Speed

Select Download Options

☐ Include Source ☐ Include Uncertainty ☐ Include Leap Day

☐ Convert UTC

[Download](#)

Download Limit Indicator

TMY datasets  
available for PSM,  
MTS1, & MTS2

# NSRDB Data Download

The screenshot displays the NSRDB Data Viewer interface. On the left, there are three panels: 'Select and Query Data', 'Download Data', and 'Download Solar Resource Data By Point'. The 'Download Data' panel is active, showing a 'Download Generation In Progress' dialog box. The dialog box contains the following information:

- Select Years:** A row of checkboxes for years from 1998 to 2014. The years 1998, 1999, and 2000 are checked. There are 'Select All' and 'Clear All' buttons.
- Select Attributes:** A list of attributes with checkboxes. The attributes are DHI, Clear Sky DHI, Cloud Type, Pressure, Total Precipitable Water, and Wind Speed. DHI, Pressure, and Wind Speed are checked.
- Select Download Options:** A row of checkboxes for 'Include Leap Day', 'Convert UTC to Local Time', and 'Half Hour Intervals'. 'Half Hour Intervals' is checked.
- Download Data Button:** A blue button with a white cursor icon pointing to it.
- Download Limit Indicator:** A progress bar.

The background of the interface shows a map of the United States with a search bar and a 'Change Base Map' button.

Click Download  
Data button when  
ready

# NSRDB Data Download

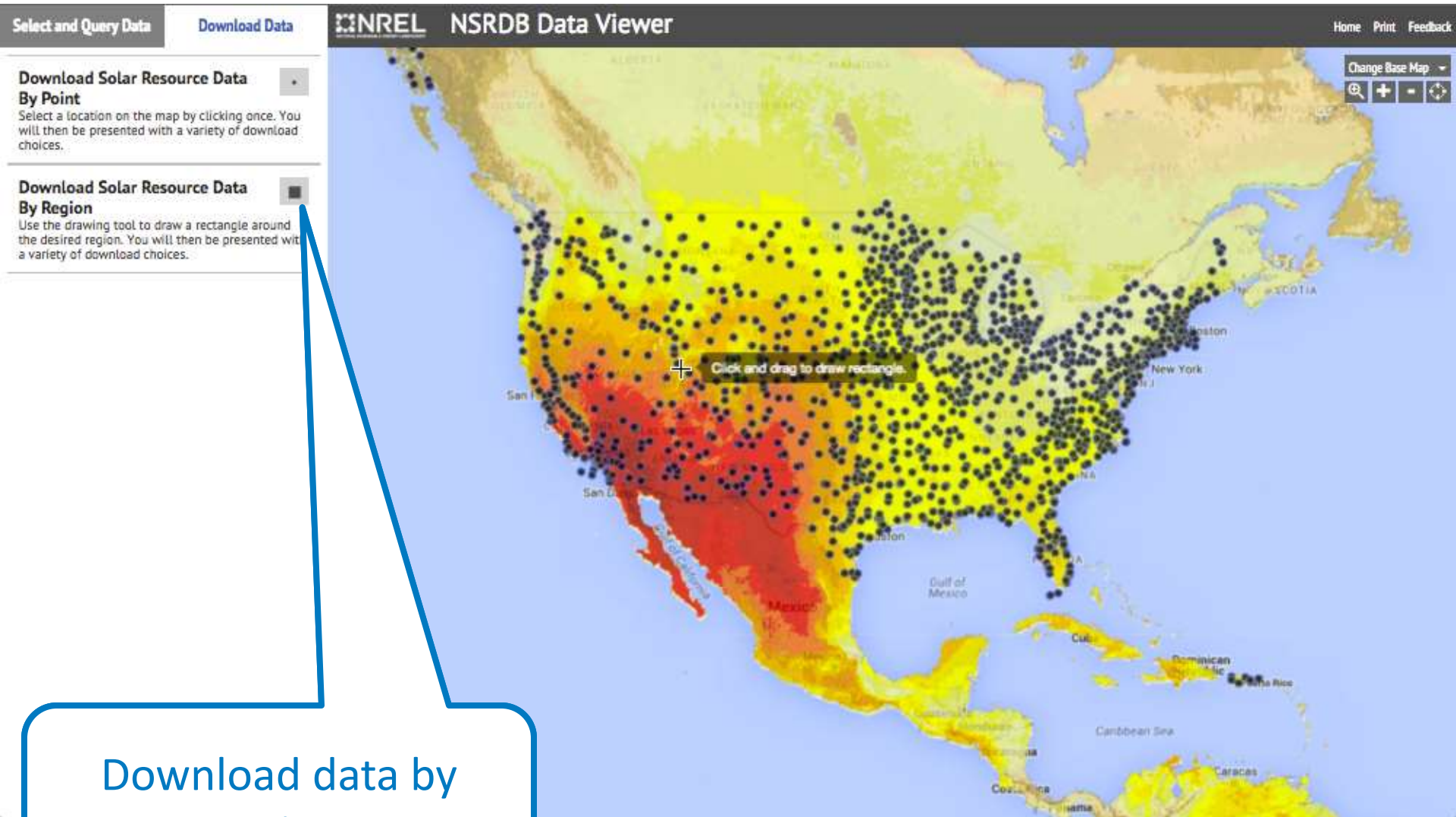
The screenshot displays the NREL NSRDB Data Viewer interface. On the left, there are three main sections: "Select and Query Data", "Download Data", and "Download Solar Resource Data By Point". The "Download Data" section is active, showing a "Download Generation In Progress" dialog box. This dialog box contains the following information:

- Select Years:** A row of checkboxes for years from 1998 to 2014. The years 1998, 1999, and 2000 are checked. There are "Select All" and "Clear All" buttons.
- Select Attributes:** A list of attributes with checkboxes. The attributes are DHI, Clear Sky DHI, Cloud Type, Pressure, Total Precipitable Water, and Wind Speed. DHI, Pressure, and Wind Speed are checked.
- Select Download Options:** A section with checkboxes for "Include Leap Day", "Convert UTC to Local Time", and "Half Hour Intervals". The "Half Hour Intervals" checkbox is checked.
- Download Data:** A blue button with a hand cursor icon.
- Download Limit Indicator:** A progress bar.

A blue callout bubble points to the "Download Data" button and contains the text: "Instructions for obtaining download will be emailed".



# NSRDB Data Download



Download data by  
region

# NSRDB Data Download

Select and Query Data

Download Data

Download Solar Resource Data By Point

Select a location on the map by clicking once. You will then be presented with a variety of download choices.

Download Solar Resource Data By Region

Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

NSREL NSRDB Data Viewer

Home Print Feedback

Change Base Map

Report a map error

Draw rectangle to obtain data for that region

# NSRDB Data Download

Select and Query Data

Download Data

Download Solar Resource Data By Point

Select a location on the map by clicking once. You will then be presented with a variety of download choices.

Download Solar Resource Data By Region

Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

Home

Print

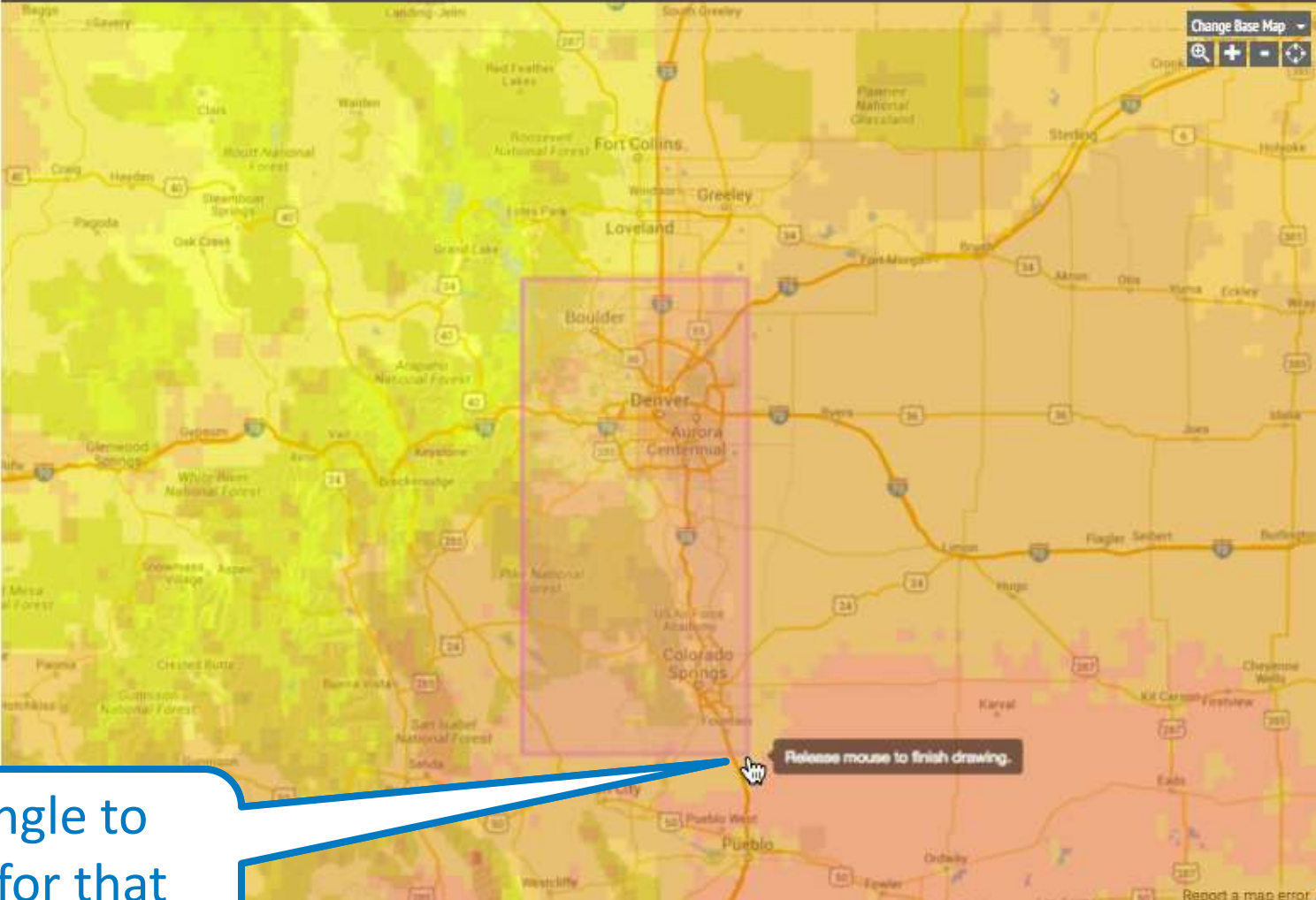
Feedback

Change Base Map

+

-

NSRDB Data Viewer



Release mouse to finish drawing.

Draw rectangle to  
obtain data for that  
region



# NSRDB Data Download

Observe download  
limit indicator to  
ensure valid download  
(this is per session)

**INREL NSRDB Data Viewer**

Select and Query Data | Download Data

**Download Solar Resource Data By Point**  
Select a location on the map by clicking once. You will then be presented with a variety of download choices.

**Download Solar Resource Data By Region**  
Use the drawing tool to draw a rectangle around the desired region. You will then be presented with a variety of download choices.

PSM | **MTS3** | MTS2 | MTS1

Select Years **Select All** **Clear All**

☐ 1998 ☐ 1999 ☐ 2000 ☐ 2001 ☐ 2002 ☐ 2003 ☐ 2004 ☐ 2005 ☐ 2006 ☐ 2007  
☐ 2008 ☐ 2009 ☐ 2010 ☐ 2011 ☐ 2012 ☒ 2013 ☒ 2014

Select Attributes **Select All** **Clear All**

Attributes for the SAM PV and CSP models have been selected by default.

☒ DNI ☐ GHI  
☐ Clear Sky DNI ☐ Clear Sky GHI  
☒ Dew Point ☒ Temperature  
☒ Relative Humidity ☐ Solar Zenith Angle  
☐ Snow Depth ☐ Wind Direction  
☐ Fill Flag

Select Download Options

☐ Include Leap Day ☐ Convert to Local Time ☒ Half Hour Intervals

**Download Data** **Download Limit Indicator**

# NSRDB Data Download

Wait for email with  
download instructions

Your data is ready! Please click the link below to download your file. This link will remain valid for 24 hours.

[https://maps.nrel.gov/api/developer\\_proxy?  
site\\_url=solar/nsrdb\\_file\\_download&filename=bfe1c9c1a9586a827001dbba3439bcad.zip](https://maps.nrel.gov/api/developer_proxy?site_url=solar/nsrdb_file_download&filename=bfe1c9c1a9586a827001dbba3439bcad.zip)

Thank you for using [The NSRDB Data Viewer](https://maps.nrel.gov/nsrdb-viewer) at  
<https://maps.nrel.gov/nsrdb-viewer>

# NSRDB Data Download

For relatively small downloads, a direct link to the zip file will be included in the email

Your data is ready! Please click the link below to download the file. This link will remain valid for 24 hours.

[https://maps.nrel.gov/api/developer\\_proxy?  
site\\_url=solar/nsrdb\\_file\\_download&filename=bfe1c9c1a9586a827001dbba3439bcad.zip](https://maps.nrel.gov/api/developer_proxy?site_url=solar/nsrdb_file_download&filename=bfe1c9c1a9586a827001dbba3439bcad.zip)

Thank you for using [The NSRDB Data Viewer](https://maps.nrel.gov/nsrdb-viewer) at  
<https://maps.nrel.gov/nsrdb-viewer>



# NSRDB Data Download

Larger downloads use the Globus service. Follow the instructions in the link to set up an account.

Your data is ready! The file is named **2015-11-30\_15:42:21/9aa67fe001a132e6aee08396673d1.zip**. This file will be available for 24 hours.

For full instructions on completing your download via Globus Connect, please view the page at: <https://nsrdb.nrel.gov/nsrdb-viewer>

Thank you for using [The NSRDB Data Viewer](https://maps.nrel.gov/nsrdb-viewer) at <https://maps.nrel.gov/nsrdb-viewer>

# NSRDB Data Download

## Globus Data Download Instructions

### STEP 1

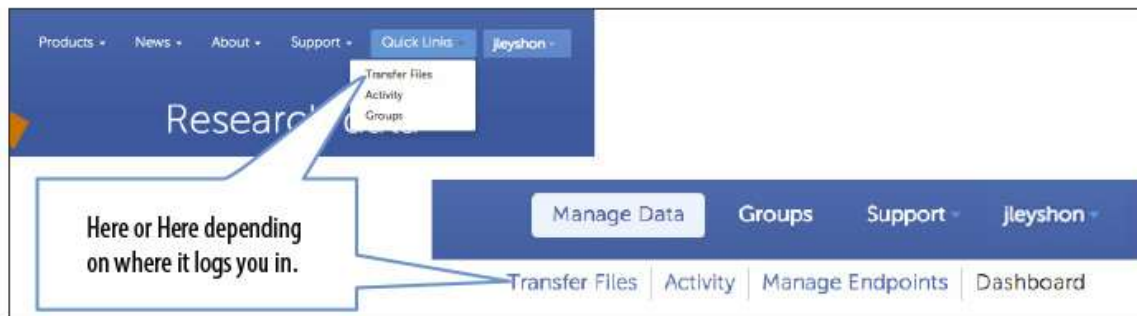
- Sign up for a Globus account at <https://www.globus.org/SignUp>. The email verification link will likely open a new browser window from your inbox and log you into Globus.

### STEP 2

- If the verification does not log you in, sign in at <https://www.globus.org/>.

### STEP 3

- Go to "Transfer Files."



### STEP 4

- Set up a Globus Connect Personal Endpoint.

### NOTE:

You will need to install the Globus Connect Personal software on your computer.

Follow this link to sign up for a Globus account

# NSRDB Data Download

## Globus Data Download Instructions

### STEP 1

- Sign up for a Globus account at <https://www.globus.org/SignUp>. The email verification link will likely open a new browser window from your inbox and log you into Globus.

### STEP 2

- If the verification does not log you in, sign in at <https://www.globus.org/>.

### STEP 3

- Go to "Transfer Files."



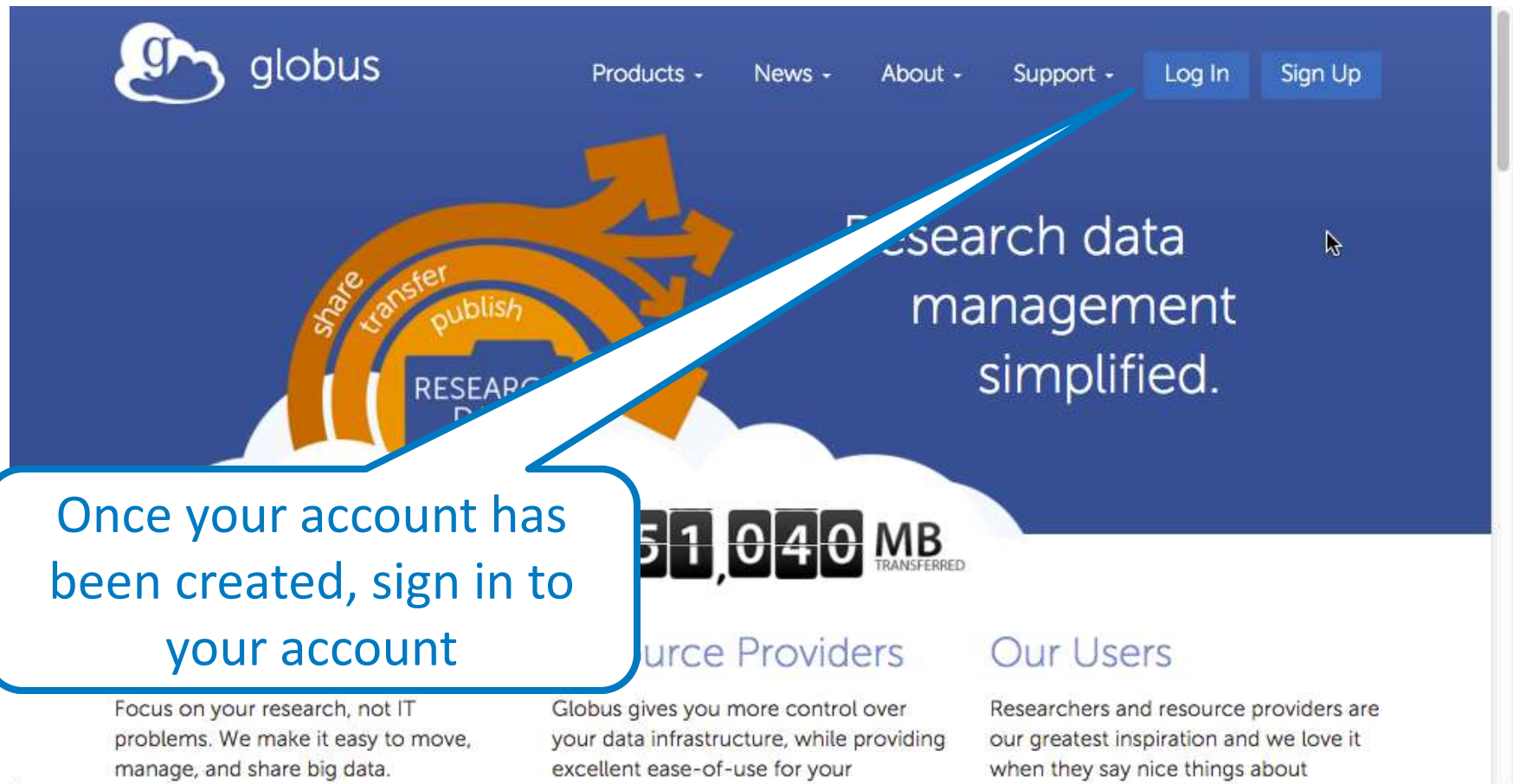
Once your account has been created, sign in to your account

- Set up a Globus Connect Personal Endpoint.

### NOTE:

You will need to download and install the software to connect to the data.

# NSRDB Data Download



The screenshot shows the Globus website interface. At the top left is the Globus logo. To its right are navigation links: Products, News, About, and Support. Further right are two buttons: Log In and Sign Up. The main banner features the text "Research data management simplified." and a graphic of three orange arrows labeled "share", "transfer", and "publish" pointing upwards. Below the banner, a counter displays "51,040 MB TRANSFERRED". At the bottom, there are three columns of text under the headings "Resource Providers" and "Our Users". A blue callout box with a white border points from the "Log In" button to the text "Once your account has been created, sign in to your account".

globus

Products - News - About - Support - Log In Sign Up

Research data management simplified.

51,040 MB TRANSFERRED

Resource Providers

Our Users

Once your account has been created, sign in to your account

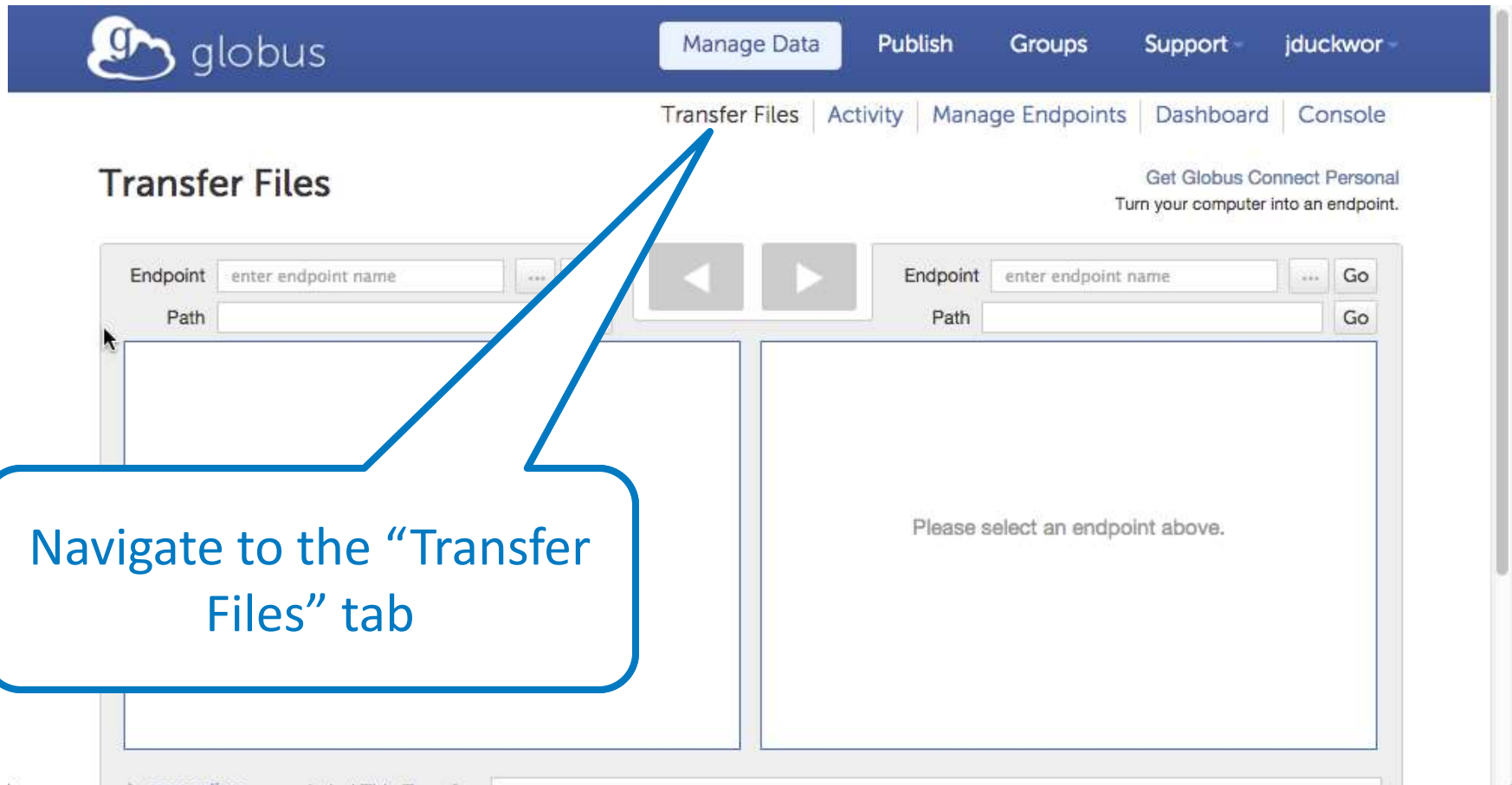
Focus on your research, not IT problems. We make it easy to move, manage, and share big data.

Globus gives you more control over your data infrastructure, while providing excellent ease-of-use for your

Researchers and resource providers are our greatest inspiration and we love it when they say nice things about



# NSRDB Data Download



The screenshot displays the Globus web interface. At the top, a dark blue header bar contains the Globus logo on the left and navigation links for 'Manage Data', 'Publish', 'Groups', 'Support', and a user profile 'jduckwor' on the right. Below this header, a secondary navigation bar features tabs for 'Transfer Files', 'Activity', 'Manage Endpoints', 'Dashboard', and 'Console'. The 'Transfer Files' tab is currently selected. The main content area is titled 'Transfer Files' and includes a sub-header 'Get Globus Connect Personal Turn your computer into an endpoint.' Below this, there are two side-by-side panels. Each panel has an 'Endpoint' input field with a dropdown arrow, a 'Path' input field, and a 'Go' button. The right panel also includes a left and right arrow button between the input fields. The right panel's main area contains the text 'Please select an endpoint above.' A blue callout box with a pointer to the 'Transfer Files' tab contains the text 'Navigate to the “Transfer Files” tab'.

globus

Manage Data Publish Groups Support jduckwor

Transfer Files Activity Manage Endpoints Dashboard Console

Transfer Files

Get Globus Connect Personal  
Turn your computer into an endpoint.

Endpoint enter endpoint name ...

Path

Endpoint enter endpoint name ... Go

Path Go

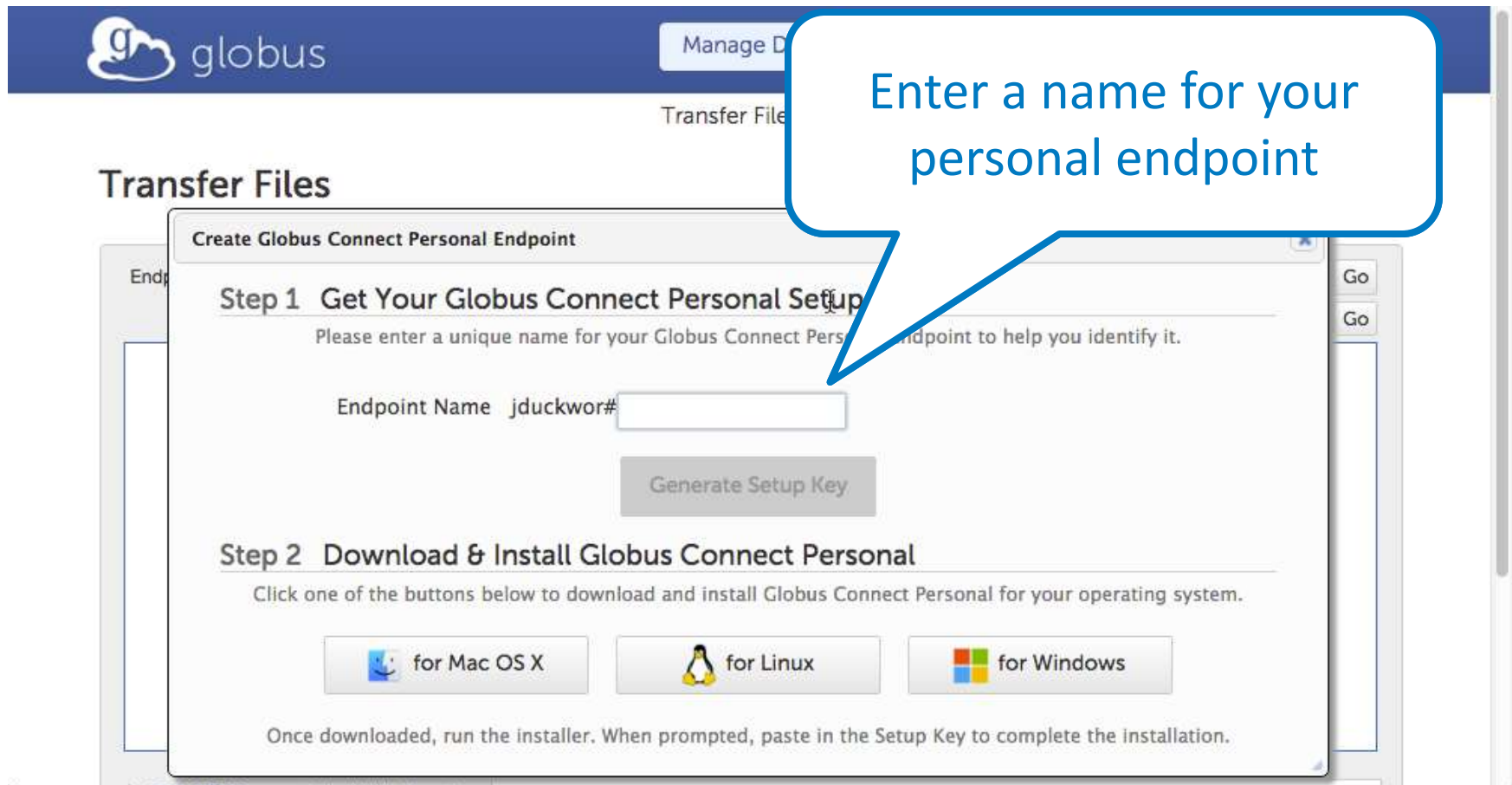
Please select an endpoint above.

Navigate to the “Transfer Files” tab

# NSRDB Data Download

The screenshot shows the Globus web interface. At the top is a dark blue header with the Globus logo and navigation links: 'Manage Data', 'Publish', 'Groups', 'Support', and a user profile 'jduckwor'. Below the header is a secondary navigation bar with links: 'Transfer Files', 'Activity', 'Manage Endpoints', 'Dashboard', and 'Console'. The main content area is titled 'Transfer Files'. On the right side of this area, there is a link that says 'Get Globus Connect Personal' with the subtext 'Turn your computer into an endpoint.' A blue callout box with a pointer directed at this link contains the text: 'Click the link and follow instructions to install Globus Connect Personal'. The main content area also features two input fields for 'Endpoint' and 'Path', each with a 'Go' button, and a large empty box with the text 'Please select an endpoint above.'

# NSRDB Data Download



The screenshot shows the Globus Connect Personal Setup window. At the top, the Globus logo and a 'Manage D' button are visible. Below, the 'Transfer Files' section is active. The window is titled 'Create Globus Connect Personal Endpoint'. It contains two steps: 'Step 1 Get Your Globus Connect Personal Setup' and 'Step 2 Download & Install Globus Connect Personal'. A callout bubble points to the 'Endpoint Name' input field in Step 1, containing the text 'Enter a name for your personal endpoint'. The input field has the text 'jduckwor#' and a 'Go' button to its right. Below the input field is a 'Generate Setup Key' button. Step 2 includes instructions to download and install Globus Connect Personal for Mac OS X, Linux, or Windows, with corresponding icons and buttons. A final instruction at the bottom states: 'Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.'

globus

Manage D

Transfer Files

Create Globus Connect Personal Endpoint

**Step 1 Get Your Globus Connect Personal Setup**

Please enter a unique name for your Globus Connect Personal endpoint to help you identify it.

Endpoint Name jduckwor#


Go


Go


Generate Setup Key

**Step 2 Download & Install Globus Connect Personal**

Click one of the buttons below to download and install Globus Connect Personal for your operating system.

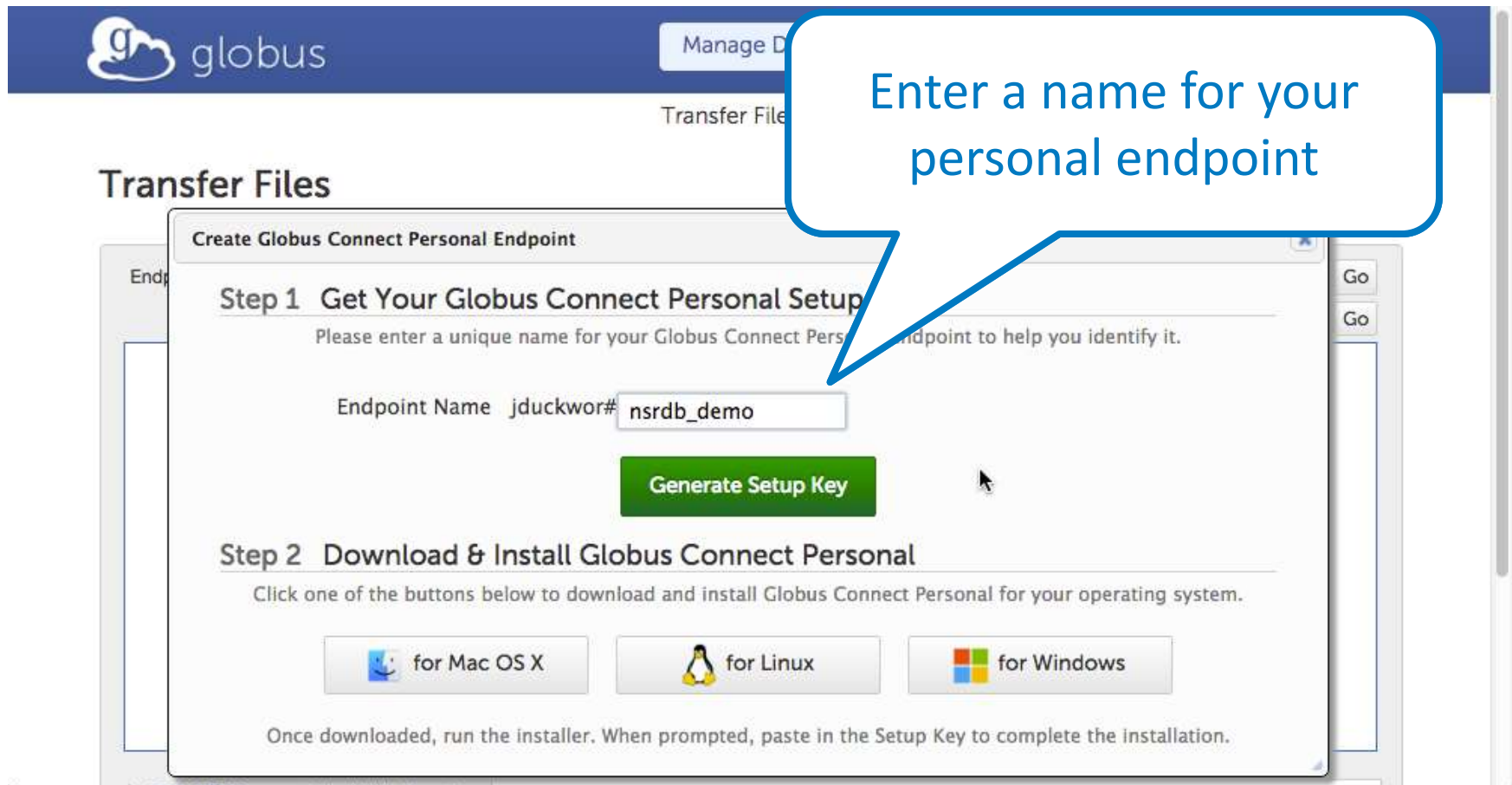
 for Mac OS X

 for Linux

 for Windows

Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.

# NSRDB Data Download



The screenshot shows the Globus Connect Personal Setup wizard. At the top, the Globus logo is on the left, and 'Manage D' and 'Transfer File' are on the right. Below this is a 'Transfer Files' section. The main window is titled 'Create Globus Connect Personal Endpoint'. It has two steps: 'Step 1 Get Your Globus Connect Personal Setup' and 'Step 2 Download & Install Globus Connect Personal'. In Step 1, there is a text input field for 'Endpoint Name' with the value 'jduckwor# nsrdb\_demo'. A green button labeled 'Generate Setup Key' is below the input field. A blue callout box with a pointer to the input field contains the text 'Enter a name for your personal endpoint'. Step 2 has instructions to click one of the buttons for Mac OS X, Linux, or Windows. At the bottom, it says 'Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.'

globus

Manage D

Transfer File

## Transfer Files

### Create Globus Connect Personal Endpoint

#### Step 1 Get Your Globus Connect Personal Setup

Please enter a unique name for your Globus Connect Personal endpoint to help you identify it.

Endpoint Name jduckwor#

[Generate Setup Key](#)

#### Step 2 Download & Install Globus Connect Personal

Click one of the buttons below to download and install Globus Connect Personal for your operating system.

[for Mac OS X](#) [for Linux](#) [for Windows](#)

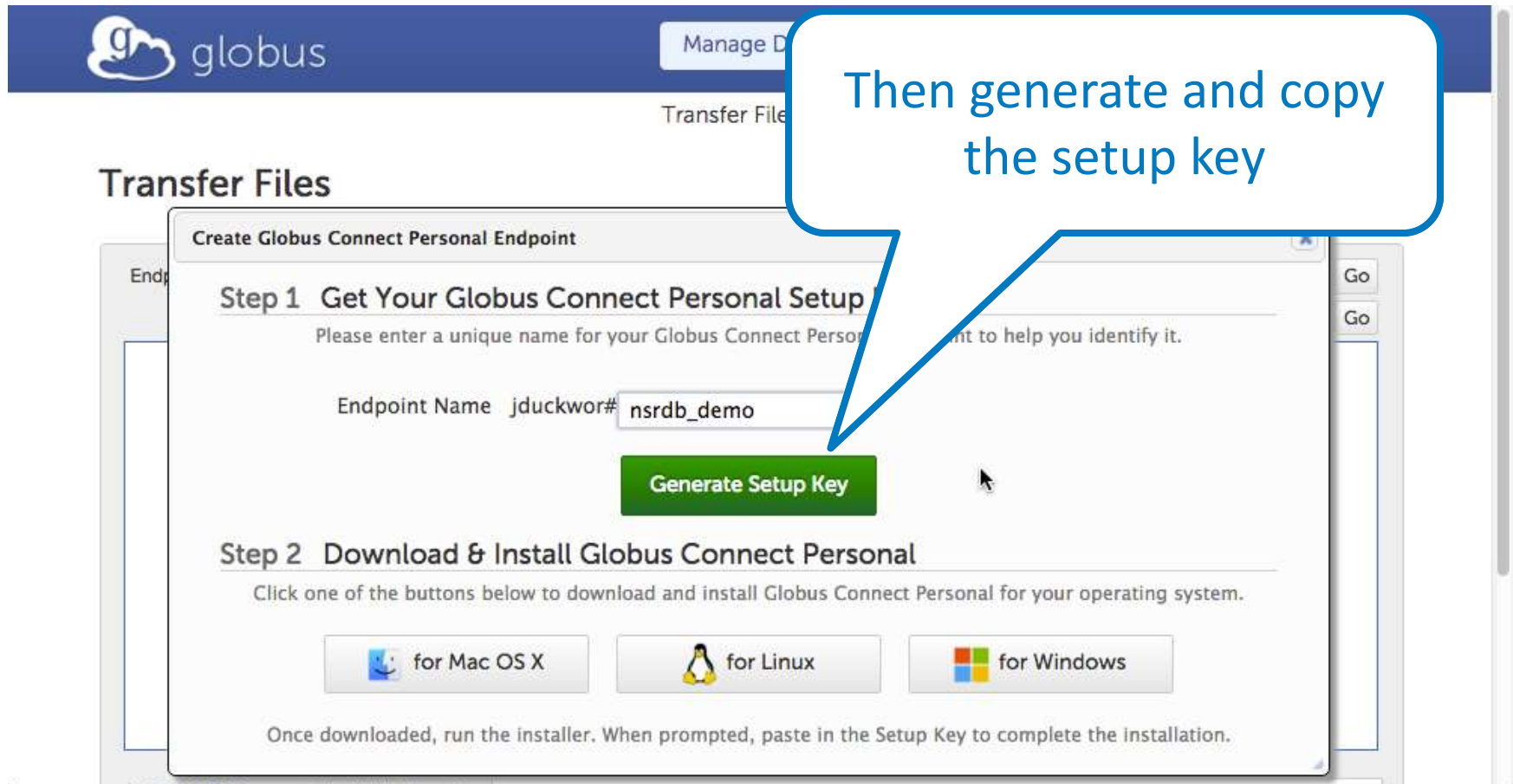
Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.

Go

Go



# NSRDB Data Download



The screenshot shows the 'Create Globus Connect Personal Endpoint' wizard. At the top, the Globus logo and 'Manage D' and 'Transfer File' links are visible. The main heading is 'Transfer Files'. The wizard has two steps: 'Step 1 Get Your Globus Connect Personal Setup' and 'Step 2 Download & Install Globus Connect Personal'. In Step 1, there is a text input field for 'Endpoint Name' with the value 'jduckwor# nsrdb\_demo'. Below this is a green button labeled 'Generate Setup Key'. A blue callout box with a pointer to this button contains the text 'Then generate and copy the setup key'. Step 2 shows three buttons for 'for Mac OS X', 'for Linux', and 'for Windows'. At the bottom, a note says 'Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.'

globus

Manage D

Transfer File

## Transfer Files

### Create Globus Connect Personal Endpoint

#### Step 1 Get Your Globus Connect Personal Setup


Please enter a unique name for your Globus Connect Personal endpoint to help you identify it.


Endpoint Name jduckwor# nsrdb\_demo


**Generate Setup Key**

#### Step 2 Download & Install Globus Connect Personal

Click one of the buttons below to download and install Globus Connect Personal for your operating system.

 for Mac OS X

 for Linux

 for Windows

Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.

Go

Go

Then generate and copy the setup key

# NSRDB Data Download

Download the application for your operating system and follow the installation instructions, entering the setup key when prompted

The screenshot shows the 'Create Globus Connect Personal Endpoint' window. At the top, the 'Globus' logo is visible. The main heading is 'Transfer Files'. Below this, the window is titled 'Create Globus Connect Personal Endpoint'. It contains two steps: 'Step 1: Get Your Globus Connect Personal Endpoint' and 'Step 2: Download & Install Globus Connect Personal'. In Step 1, there is a text input field for 'Endpoint Name' with the value 'jduckwor# nsrdb\_demo' and a green 'Generate Setup Key' button. In Step 2, there are three buttons for downloading the installer: 'for Mac OS X', 'for Linux', and 'for Windows'. A final instruction at the bottom states: 'Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.'

globus

Transfer Files

Create Globus Connect Personal Endpoint

Step 1: Get Your Globus Connect Personal Endpoint

Please enter a unique name for your Globus Connect Personal Endpoint to help you identify it.

Endpoint Name: jduckwor# nsrdb\_demo

Generate Setup Key

Step 2: Download & Install Globus Connect Personal

Click one of the buttons below to download and install Globus Connect Personal for your operating system.

for Mac OS X for Linux for Windows

Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.

With Globus Connect  
Personal set up, search for  
the nrelgds#nrel\_nsrdb  
endpoint






# NSRDB Data Download

## Transfer Files

Endpoint

Path

select all | none

	2015-11-30_15:34:46	Folder
	2015-11-30_15:42:21	Folder
	test.txt	0 b

Please select an endpoint above.

[more options](#) Label This Transfer

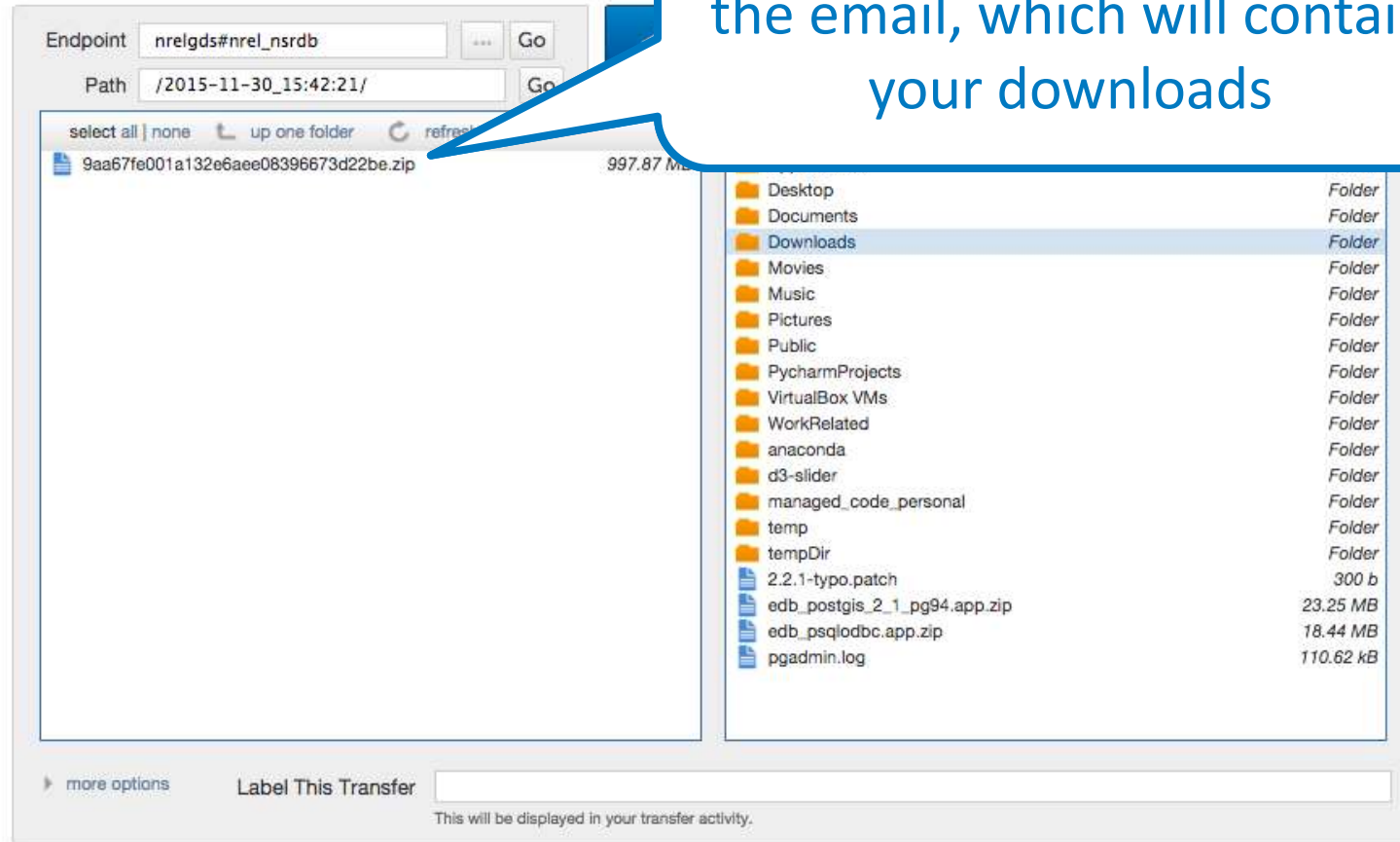
This will be displayed in your transfer activity.

Find the directory specified in the email, which will contain your downloads

# NSRDB Data Download

## Transfer Files

Find the directory specified in the email, which will contain your downloads



Endpoint: nrelgds#nrel\_nsldb Go

Path: /2015-11-30\_15:42:21/ Go

select all | none | up one folder | refresh

9aa67fe001a132e6aee08396673d22be.zip 997.87 MB

Desktop	Folder
Documents	Folder
Downloads	Folder
Movies	Folder
Music	Folder
Pictures	Folder
Public	Folder
PycharmProjects	Folder
VirtualBox VMs	Folder
WorkRelated	Folder
anaconda	Folder
d3-slider	Folder
managed_code_personal	Folder
temp	Folder
tempDir	Folder
2.2.1-typo.patch	300 b
edb_postgis_2_1_pg94.app.zip	23.25 MB
edb_psycopg.app.zip	18.44 MB
pgadmin.log	110.62 kB

more options Label This Transfer

This will be displayed in your transfer activity.

# NSRDB Data Download

## Transfer Files

Get Globus Connect Personal  
Turn your computer into an endpoint.

Endpoint:  Go

Path:  Go

select all | none | up one folder | refresh list

9aa67fe001a132e6aee08396673d22be.zip 997.87 MB

Endpoint:  Go

Path:  Go

select all | none | up one folder | refresh list

applications Folder

Desktop Folder

Documents Folder

Downloads Folder

Movies Folder

Music Folder

Pictures Folder

Public Folder

PycharmProjects Folder

VirtualBox VMs Folder

WorkRelated Folder

anaconda Folder

d3-slider Folder

managed\_code\_personal Folder

temp Folder

tempDir Folder

2.2.1-typo.patch 300 b

edb\_postgis\_2\_1\_pg94.app.zip 23.25 MB

edb\_psycopg.app.zip 18.44 MB

pgadmin.log 110.62 kB

more options Label This Transfer

This will be displayed in your transfer activity.

# NSRDB Data Download

## Transfer Files

Get Globus Connect Personal  
Turn your computer into an endpoint.

The screenshot shows the Globus Transfer Files interface with two endpoints. The left endpoint is 'nrelgds#nrel\_nsrdb' with path '/2015-11-30\_15:42:21/'. It contains a single file: '9aa67fe001a132e6aee08396673d22be.zip' (997.87 MB). The right endpoint is 'jduckwor#work\_endpoint' with path '/~/'. It contains a list of folders and files. A blue callout bubble points to the 'Downloads' folder in the right endpoint's list.

Endpoint: nrelgds#nrel\_nsrdb Path: /2015-11-30\_15:42:21/

Endpoint: jduckwor#work\_endpoint Path: /~/

select all | none | up one folder | refresh list

9aa67fe001a132e6aee08396673d22be.zip 997.87 MB

Applications Folder  
Desktop Folder  
Documents Folder  
Downloads Folder  
Movies Folder  
Music Folder  
Pictures Folder  
Public Folder  
PycharmProjects Folder  
VirtualBox VMs Folder  
WorkRelated Folder  
anaconda Folder  
d3-slider Folder  
managed\_code\_personal Folder  
temp Folder  
tempDir Folder  
2.2.1-typo.patch 300 b  
edb\_postgis\_2\_1\_pg94.app.zip 23.25 MB  
edb\_psycopg.app.zip 18.44 MB  
pgadmin.log 110.62 kB

... and select the directory to which you would like to direct the downloads

more options Label This Transfer This will be displayed in your transfer activity.



# NSRDB Data Download

## Transfer Files

Get Globus Connect Personal  
Turn your computer into an endpoint.

The screenshot displays the Globus Transfer Files interface. On the left, an endpoint named 'nrelgds#nrel\_nsrdb' is selected with the path '/2015-11-30\_15:42:21/'. A file named '9aa67fe001a132e6aee08396673d22be.zip' (997.87 MB) is listed. On the right, an endpoint named 'jduckwor#work\_endpoint' is selected with the path '/~/Downloads/'. A callout box with a blue border and a blue arrow pointing to the right endpoint's path field contains the text: '... and select the directory to which you would like to direct the downloads'. At the bottom, there is a 'more options' link, a 'Label This Transfer' input field, and a note: 'This will be displayed in your transfer activity.'

Endpoint: nrelgds#nrel\_nsrdb Path: /2015-11-30\_15:42:21/ Go

select all | none | up one folder | refresh list

9aa67fe001a132e6aee08396673d22be.zip 997.87 MB

Endpoint: jduckwor#work\_endpoint Path: /~/Downloads/ Go

select all | none | up one folder | refresh list

... and select the directory to which you would like to direct the downloads

more options Label This Transfer This will be displayed in your transfer activity.

# NSRDB Data Download

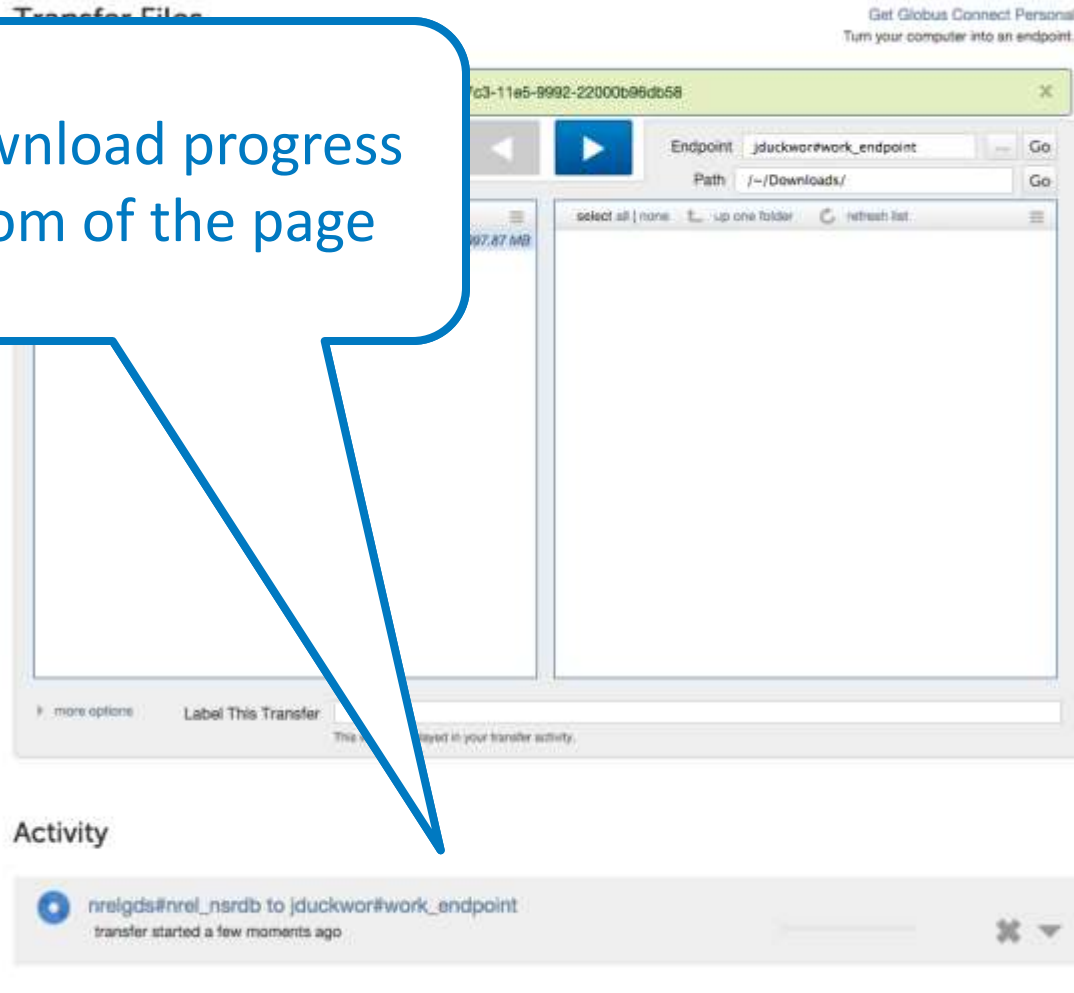
## Transfer Files

Get Globus Connect Personal  
Turn your computer into an endpoint.

The screenshot displays the Globus Transfer Files interface. On the left, an endpoint named 'nrelgds#nrel\_nsrdb' is selected with the path '/2015-11-30\_15:42:21/'. A file named '9aa67fe001a132e6aee08396673d22be.zip' is listed. On the right, an endpoint named 'jduckwor#work\_endpoint' is selected with the path '/~/Downloads/'. A blue callout box with a white border points to a blue right arrow button located between the two endpoint panels. The callout contains the text: 'Click the right arrow to transfer files to your chosen directory'. At the bottom, there is a 'more options' link, a 'Label This Transfer' input field, and a note: 'This will be displayed in your transfer activity.'

# NSRDB Data Download

Monitor download progress  
at the bottom of the page



# Data Format

## Standard Time-Series Data File Format

also known as **SAM CSV**

## Header

Field	Units	Recognized Names
Latitude	degrees	<i>latitude,lat</i>
Longitude	degrees	<i>longitude,lon,long,lng</i>
Time zone	hours offset from GMT	<i>tz,timezone,time zone</i>
Site elevation	meters above sea level	<i>el,elev,elevation,site elevation</i>
Year	n/a	<i>year</i>
Location ID	n/a	<i>id,location,location id,station,station id,wban,wban#</i>
City	n/a	<i>city</i>
State	n/a	<i>state,province,region</i>
Country	n/a	<i>country</i>
Source	n/a	<i>source,src</i>
Description	n/a	<i>description,desc</i>
URL	n/a	<i>url</i>
Units flag	yes or no	<i>hasunits,units</i>
Interpolate flag	yes or no	<i>interpmet</i>



# Data Format

## Data Columns

Field	Units	Recognized names
Year	1950-2050	<i>year, yr</i>
Month	1-12	<i>month, mo</i>
Day	1-31	<i>day</i>
Hour	0-23	<i>hour, hr</i>
Minute	0-59	<i>min, minute</i>
Global horizontal irradiance	W/m2	<i>gh, ghi, global, global horizontal, global horizontal irradiance</i>
Beam normal irradiance	W/m2	<i>dn, dni, beam, direct normal, direct normal irradiance</i>
Diffuse horizontal irradiance	W/m2	<i>df, dhi, diffuse, diffuse horizontal, diffuse horizontal irradiance</i>
Ambient dry bulb temperature	C	<i>tdry, dry bulb, dry bulb temp, temperature, ambient, ambient temp</i>
Wet bulb temperature	C	<i>twet, wet bulb, wet bulb temperature</i>
Dew point temperature	C	<i>tdew, dew point, dew point temperature</i>
Wind speed	m/s	<i>wspd, wind speed</i>
Wind direction	deg	<i>wdir, wind direction</i>
Relative humidity	%	<i>rh, rhum, relative humidity, humidity</i>
Atmospheric pressure	millibar	<i>pres, pressure</i>
Snow cover	cm	<i>snow, snow cover, snow depth</i>
Ground reflectance (albedo)	0..1	<i>albedo, alb</i>
Aerosol optical depth	0..1	<i>aod, aerosol, aerosol optical depth</i>

# NSRDB API

Variable	Description	Inputs
<b>names</b>	Year of interest	1998-2014; tmy
<b>interval</b>	30 minute or hourly data	30; 60
<b>full_name</b>	Name user	Text
<b>affiliation</b>	Affiliation of user	Text
<b>reason</b>	Short description of purpose for downloading data	Text
<b>Attributes</b>	Attributes to return	dhi,dni,ghi,clearsky_dhi,clearsky_dni,clearsky_ghi,cloud_type,dew_point,surface_air_temperature_nwp,surface_pressure_background,surface_relative_humidity_nwp,solar_zenith_angle,total_precipitable_water_nwp,snow_depth,wind_direction_10m_nwp,wind_speed_10m_nwp,fill_flag

# NSRDB API

[http://developer.nrel.gov/api/solar/nsrdb\\_0512\\_download.csv?wkt=POINT\({-104.5%2039.5}\)&names=1998&leap\\_day=false&interval=30&utc=false&full\\_name=YOUR\\_NAME&email=YOUR\\_EMAIL&affiliation=NREL&mailing\\_list=false&reason=SAM&api\\_key=YOUR\\_API&attributes=dhi,dni,wind\\_speed,surface\\_air\\_temperature](http://developer.nrel.gov/api/solar/nsrdb_0512_download.csv?wkt=POINT({-104.5%2039.5})&names=1998&leap_day=false&interval=30&utc=false&full_name=YOUR_NAME&email=YOUR_EMAIL&affiliation=NREL&mailing_list=false&reason=SAM&api_key=YOUR_API&attributes=dhi,dni,wind_speed,surface_air_temperature)

Sample API Call

Sample Python using  
Pandas

```
In [2]: # year and location of interest
year, lon, lat = 2006, -104.5, 39.5
# Grabbing all but first 2 lines
df = pd.read_csv('http://developer.nrel.gov/api/solar/nsrdb_0512_download.csv?wkt=POINT({lon}%20{lat})&names={year}&leap_day=false&interval=30&utc=false&full_name=YOUR_NAME&email=YOUR_EMAIL&affiliation=NREL&mailing_list=false&reason=SAM&api_key=YOUR_API&attributes=dhi,dni,wind_speed,surface_air_temperature')
# Set the time index in the pandas dataframe
df = df.set_index(pd.date_range('1/1/{yr}'.format(yr=year), freq='30Min', periods=17520))
# off and running!
df.head()
```

```
Out[2]:
```

	Year	Month	Day	Hour	Minute	DHI	DNI	Temperature	Wind Speed
2006-01-01 00:00:00	2006	1	1	0	0	0	0	3.487848	5.069017
2006-01-01 00:30:00	2006	1	1	0	30	0	0	3.631738	4.952465
2006-01-01 01:00:00	2006	1	1	1	0	0	0	3.775598	4.835914
2006-01-01 01:30:00	2006	1	1	1	30	0	0	3.790918	4.583948
2006-01-01 02:00:00	2006	1	1	2	0	0	0	3.806238	4.331983

# Data Availability

- **USA: 1998-2014**
- **Other countries: 1998-2014, with 2005-2012 available publicly**
  - List of Countries: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, British Virgin Islands, Canada, Cape Verde, Cayman Island, Chile, Colombia, Costa Rica, Cuba, Curaçao, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Kiribati, Mexico, Montserrat, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Barthélemy, Saint Lucia, Sint Maarten, St Vincent and the Grenadines, St-Martin, St. Kitts and Nevis, St. Pierre and Miquelon, Suriname, Trinidad and Tobago, Turks and Caicos Islands, U.S. Minor Outlying Islands, U.S. Virgin Islands, and Venezuela
  - To obtain the full 1998-2014 dataset, please contact [nsrdb@nrel.gov](mailto:nsrdb@nrel.gov)



# Future Plan

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- **Summary statistics layers**
- **Biannual updates**
- **Spectral data**
- **Plane-of-array irradiance**
- **Algorithm improvements**
- **Fix some outstanding issues**
  - Relative humidity

# Questions?

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**Main Website:** [nsrdb.nrel.gov](https://nsrdb.nrel.gov)

**Publications:** [nsrdb.nrel.gov/publications](https://nsrdb.nrel.gov/publications)

**Access Data:** [nsrdb.nrel.gov/nsrdb-viewer](https://nsrdb.nrel.gov/nsrdb-viewer)